First Copy

A National Newspaper for Every Branch of the Industry

Automotive Daily News

CARS · SHOP EQUIPMENT · TRUCKS · AVIATION · PARTS · ACCESSORIES · TIRES

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Technical Sessions, Golf Tournament Divide Time Of Delegates at Meeting

Qualifying Rounds Completed; Survivors Prepare For Real Competition; Passenger Car Comforts, Appointments Discussed

WHITE SULPHUR SPRINGS, W. Va., June 16.—This was passenger car day as far as technical sessions go. In the morning at 10 o'clock the passenger car body session got under way in the Auditorium, with Clayt Hill of Dietrich presiding.

H. A. Brunn's paper on "Comfort and Interior Appointments" brought on a considerable amount of interesting comment and elaboration. R. F. Anderson of the Murray Corporation then explained what the body designer wants in the chassis.

This evening at 8.30 the passenger car session is due to get under way in the Auditorium, with Walter C. Keys of Detroit in the chair. W. T. Fishleigh has a paper on the "Tear Drop Car," which is likely to start some earnest discussion. J. E. Hale of Firestone is going to talk on "Driving High Speed Cars."

During the afternoon society members disported themselves on the links and other places, according to their separate fancies.

The men's qualifying rounds for the annual golf tournament at the S. A. E. summer meeting were completed Monday evening. There will be four flights in the final round. The championship flight, however, will consist of only fifteen players.

The qualifying scores of those who will participate in the final

(Continued on Page 10)

HANCH SEES POTENTIAL U. S. DEMAND OF OVER 5,000,000 NEW CARS

CHICAGO, June 16.—There exists today in the United States a potential demand for more than 5,000,000 automobiles because of the obsolete models traveling the streets and highways today, according to C. C. Hanch, general manager of the National Association of Finance Companies.

With the return of public confidence, Mr. Hanch believes the automobile industry should rapidly increase its output to supply the great replacement market, for there are more than 10,000,000 cars five years old or older still in use, according to the figures compiled by the association. A sixth of the automobiles traveling the streets this year were manufactured in 1929.

"Of the 24,324,000 cars in use at

(Continued on Page 7)

FOR quick dispatch of S. A. E. news this week, see

William C. Callahan

news editor of Automotive Daily News, who will be at the Greenbriar from June 13 to June 19.

News received in New York by 11 o'clock in the morning will appear in the issue of this paper distributed next morning at White Sulphur Springs. If you have a news item of any kind, see Mr. Callahan. Remember the difference in daylight saving time.

MARMON GETS ADDED WORKING CAPITAL IN FINANCING PROGRAM

INDIANAPOLIS, June 16.—Eastern banking interests are entering into a financing program with

(Continued on Page 7)

Discussions on Papers at Fuel Sessions Reveal Industry Has Progressed Rapidly in Field

Keen Interest Displayed by S. A. E. Delegates in Kegerries' Carburetor Design for Research, Gum in Gasoline, Diesel Fuels

By WILLIAM C. CALLAHAN
News Editor

WHITE SULPHUR SPRINGS, W. Va., June 16.—Some very interesting discussions developed at the Monday fuel sessions, extracts of which follow:

The meeting convened at 8.30 o'clock, A. L. Beall presiding.

Chairman Beall: "There is no subject in automotive engineering on which our precise knowledge has been more recent than that of fuel utilization. I think there are several gentlemen in our audience who do not show any gray hair who can remember the only information we had on fuel utilization was how to adjust a carburetor. Our papers tonight apparently indicate that we have considerably more information than we had a few years ago.

"In developing a method of knock-testing a carburetor of special design was essential. The detonation sub-committee called on an authority in the line of carburetor design, and we all feel that his response was more than adequate."

Mr. Kegerreis presented his prepared report.

Chairman Beall: "It is always a question with a new design whether it works or not. Any one with an acute ear, if he will listen just a second, can hear an engine running on this carburetor. That will be demonstrated tonight and tomorrow to those who are interested. Mr. Kegerreis has shown us a four-bowl carburetor which, to the initiated, means that we can use three reference fuels and the unknown fuel. If it is possible to spread those reference fuels ten octane numbers apart, it is also possible to cover a range of thirty octane numbers without changing the reference fuels in the bowls.

"Mr. Brooks has a theory, and probably a practice, which indicates that it is possible to work along these lines without changing

(Continued on Page 2)

NEW IMPROVED PLYMOUTH DUE

Chrysler Plans Intensive Competition in Low Price Field

Special from A. D. N. Detroit Bureau

DETROIT, June 16.—While the factory people will make no definite statements in the matter, it is true that a new Plymouth model is coming through which will be sensational in the way of mechanical changes and which also will mean stronger competition for Chevrolet and Ford in the low priced field on the part of Walter P. Chrysler.

The new Plymouth will continue with a four-cylinder power plant, but including the adoption of a new principle which is said to have conquered vibration in a four. In addition the Plymouth will have free-wheeling and a claimed speed of 70 miles per hour. The price range will run from $535 to $695.

It is understood there will be no change in the manner of distribution, the Plymouth company planning to continue marketing its

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Bendix Foursome at White Sulphur Springs

IN BETWEEN the technical sessions of the S. A. E. summer meeting at White Sulphur Springs, W. Va., the above officials of the Bendix Corporation put in considerable time on the links. They are (left to right) F. B. Miller, South Bend, Ind.; Otto C. Lang, Detroit; J. R. Bartholomew, Detroit; A. C. Chambers, Detroit

Late News Flashes

New York, June 16.—The Greyhound Corporation has taken delivery of 74 buses of an order totaling 88. Sixty-six of these were ordered from Yellow Truck, eighteen from Mack and four from White.

* * *

Tulsa, June 16.—Daily average production of crude oil in United States week ended June 13 totaled 2,443,603 barrels, a decrease of 30,170 barrels, according to Oil and Gas Journal.

* * *

Oklahoma City, June 16.—No more oil proration orders will be signed by C. C. Childers, a member of the Corporation Commission of Oklahoma, until Congress places an embargo or tariff on foreign oils and oil products or until Texas adopts a proration program in keeping with Oklahoma, he declared in a statement recently.

Seen and Heard at S. A. E. Summer Meeting—See Page 7

At Play Between S. A. E. Sessions

PICTURED ABOVE (left to right), Norman G. Schidle, Philadelphia; H. B. Coleman, West Chester, Pa., Standard Oil; David Beecroft, New York, Bendix; Cornelius T. Myers, Rahway, Chassis Lubricating Co.

Discussion of Fuel Papers Shows Progress of Industry

(Continued from Page 1)

the reference fuels over about thirty octane numbers. Mr. Brooks will now tell us how he does it."

Mr. Brooks presented his prepared paper, "The Interpolation Method in Detonation Testing."

Miss Aldrich presented the paper prepared by O. C. Bridgeman and E. W. Aldrich, "Further Developments in Determining Gum in Gasoline."

Chairman Beall: It is obvious from this paper that the gum problem is a real one. While we have made progress, we are not far along the road as yet.

"I think we have some prepared discussions for this particular paper. The preprints were not available very early so that the discussion can only take the form of remarks.

"I might say that the gum problem consists of three phases: First, we need to decide upon one of the methods for measuring gum which will be reproducible from one laboratory to another. There are enough methods, but not enough reproducibility.

"We are then in a position to correlate the method for determining gum in gasoline with the gum deposition in the engine manifolds and valve pockets, which is the second phase of the problem.

"Third, the refiner in particular is interested in the stability of his gasoline. That phase of the problem must necessarily await the solution of the first two phases."

C. M. Larson, Sinclair Refining Company: "This matter of gum with us used to be quite troublesome in Kansas where we used to use a copper chloride treatment to make a water white gasoline on our premium fuel, and for the same millimeters of gum in the copper dish we would have just double the amount of trouble in that state. But since we have taken on ethyl and now that the Ethyl Corporation tells us whether or not gum is satisfactory we have just passed out of the picture."

O. C. Bridgeman, Bureau of Standards: "It seems to me it doesn't make any difference how reproducible a method is unless it is significant. We all know that the copper dish method means absolutely nothing except that if a gasoline passes a copper dish test

(Continued on Page 5)

SPARKS from DETROIT

Detroit Safety Tests

* * *

Recalls S. A. E. Meetings

* * *

Radio Sells Used Cars

* * *

Chris Sinsabaugh—Detroit Editor

SOMETHING like 25,000 cars took the tests conducted during safety week by the Automobile Club of Michigan (we still think of it as the ancient and honorable Detroit Automobile Club, despite the change of name), which co-operated with the Police Department and the Detroit Automobile Dealers' Association. There was nothing compulsory about it. It was the annual opportunity offered by the club for drivers to get free examinations of brakes, lights, horns, etc., and check up on wheel alignment.

Those who came through with a clean slate were marked 100 per cent. and given a perfect-score sticker for their windshields, but an analysis of the examinations brings out that fewer than one-third of the 25,000 won this glory. But, as showing the feelings of the drivers themselves, it is worth recording that many of them, after finding something wrong, visited the repair shops and, after getting fixed up, tried again for the 100 per cent. rating.

Brakes were the major fault and next came wheels out of line. Lights and horns came through with flying colors. Comparing the results with last year's tests, one finds little difference. Last year brakes were most at fault.

One phase of safety week, which is commented on editorially by the Detroit Times, was the willingness of the drivers to take the tests. As the Times says: "Despite the utmost caution of its drivers, every one of those (defective) cars has been a menace to pedestrian safety. Their drivers are careful. Otherwise, they would have ignored the opportunity for free mechanical tests. Many other thousands of drivers of mechanically imperfect cars will pay no attention to the free tests."

* * *

S. A. E. activities this week at White Sulphur Springs bring back recollections of other mid-summer meetings, particularly the one of 1916, when the engineers boarded the Noronic at Detroit for a week's cruise. Going by boat, the management did not have to worry about rounding up the members for the meetings which were held on board. Other attractions did not interfere.

Harking back to that trip, the column conductor remembers an incident that gave our own Harry Tarantous an anxious two days and makes one realize the boon of radio as we enjoy it now.

Just as the Noronic was pulling away from the pier at Detroit a messenger boy appeared on the dock and paged "H. A. Tarantous," waving a telegram. The A. D. N. b. m., leaning over the rail, heard the call, and the telegram was thrown aboard, but by the time it was opened and it was discovered to be a message from home telling of sickness in the family and urging the return of H. A. T., the Noronic was so far out in the stream it was impossible to get ashore. Not until the boat got to Mackinac, two days later, was the anxiety of the big chief relieved by another telegram, advising him all was well at home. Had we had radio, how different it would have been!

* * *

AND talking about radio, I was on the air the other night and heard the local Cadillac branch broadcasting its bargains in used cars. It struck me as a clever idea, particularly as the announcer only told about two or three bargains, emphasizing the advantages of each instead of devoting the time to advising the listeners that Cadillac had a floor of used cars of extraordinary value, come and see 'em.

Checking with the branch, I find that this sort of air advertising in which the individual value of each car is stressed brings in many. Quoting the price seems to turn the trick. A man owning a car in the price bracket below Cadillac or La Salle, hearing he can get a used Cadillac or a La Salle in fine shape at a price about what he has paid for the car he is driving, is most responsive to this appeal.

Delivering Oils and Gasoline Profitably

With summer and its accompanying increase in demand for automobile lubricants and fuels well on its way, the following survey on "Delivering Oils and Gasoline Profitably," which was compiled by the General Motors Truck Company, Pontiac, Mich., should be of particular interest. The full text of the report covering the facts brought out during the survey is appearing serially in Automotive Daily News. The report in pamphlet form is also available at all General Motors Truck Company dealers and distributorships.

THE specialized types of tank equipment which the distributor must have for delivery of the bulk of his products make it practically necessary for every distributor to own sufficient equipment to handle all his delivery demands—even the extreme peaks. And since his volume fluctuates, the unavoidable result is idle equipment or equipment not producing its full capacity of work during dull seasons.

The problem of keeping equipment busy the year around has become less and less acute for the operator of gasoline and lubricating oil trucks since all-year-round driving has become the rule, rather than the exception, with motorists. Operators estimated, during this survey, that volume fell on an average of only 10 per cent. to 15 per cent. in these lines during the winter months. And with so little reduction of volume over two or three winter months, the extra truck time is readily absorbed in carrying on necessary overhauling, painting and other maintenance work which cannot be undertaken economically during busy seasons.

Every distributor should remember, however, that even during dull ties it seldom pays to operate more trucks than are absolutely needed to accomplish the work at hand. Operating surplus truck capacity increases operating costs in two ways:

1. The trucks run up excessive mileage. When deliveries which could be handled by four trucks, for example, are split among five or six trucks, there invariably is a duplication of mileage which increases running expense.

2. Drivers' salaries are excessive. Operating one or two surplus trucks means paying salaries to the drivers on those trucks. This expense could be saved or minimized if the truck were taken out of service. In some cases, the distributor may find it desirable to lay off these drivers when dull periods are extended. When this is not practical, however, it is more profitable to use the spare drivers for maintenance work, or to use them as helpers on stake trucks, than to operate surplus equipment.

Fuel Oil Delivery the Major Problem

It is in fuel oil truck operation, however, that seasonal fluctuations are a serious problem. As the accompanying chart indicates, fluctuations in fuel oil deliveries are great, running as high as 70 to 85 per cent., depending largely on the volume of steady, industrial business handled by the fuel oil distributor.

The goal in solving this problem is obvious. It is twofold:

1. The distributor must devise ways and means of softening peak demands, so that less truck capacity is required to meet them.

2. The distributor must attempt to build his off-season business or supply other uses for his trucks in order to avoid excessive, costly, idle time.

*Problems of the coal retailer in overcoming peaks, the principles of which are applicable to the fuel oil distributor, are discussed thoroughly in another report of this series. Ask your General Motors truck representative to supply you with a copy of "Making Coal Deliveries Profitable."

(TO BE CONTINUED.)

SEASONAL DEMAND ROR FUEL OIL

The following figures, based on reports of eleven representative burning oil distributors, show the extent of seasonal fluctuations in sales:

Month	Gallons	% of Total	% of Jan. Peak
May	2,600,000	3.4%	17%
June	2,200,000	2.9%	15%
July	1,700,000	2.2%	11%
August	2,000,000	2.6%	13%
September	4,000,000	5.3%	27%
October	4,600,000	6.0%	30%
November	7,800,000	10.3%	52%
December	11,400,000	15.0%	75%
January	15,000,000	19.7%	100%
February	12,000,000	15.8%	80%
March	8,000,000	10.5%	53%
April	4,800,000	6.3%	32%

Courtesy Burning Oil Distributors Association, Chicago.

S. O. CO. ERECTING NEW PLANT IN NEW JERSEY

Burlington, N. J., June 16.—A large storage and distribution plant will be constructed by the Standard Oil Company of New Jersey in East Burlington, twenty acres of land having been purchased for this purpose.

The proposed plant will take the place of the present small plant in West Burlington. A large dock on the Delaware River, for unloading of ocean-going oil and gasoline barges, is included in the plans for the new Standard plant. The plans also call for the erection of a number of storage tanks, business offices and other buildings.

NORTHERN BUILDING GARAGE AT GRUNDY CENTER, IA.

Grundy Center, Ia., June 16.—Leonard Mathern is constructing a sales and service garage, 44 by 52 feet, of hollow block tile, and will open for business during the latter part of the month in the new home.

NEW OWNERSHIP OF N. J. BUS LINE GETS APPROVAL

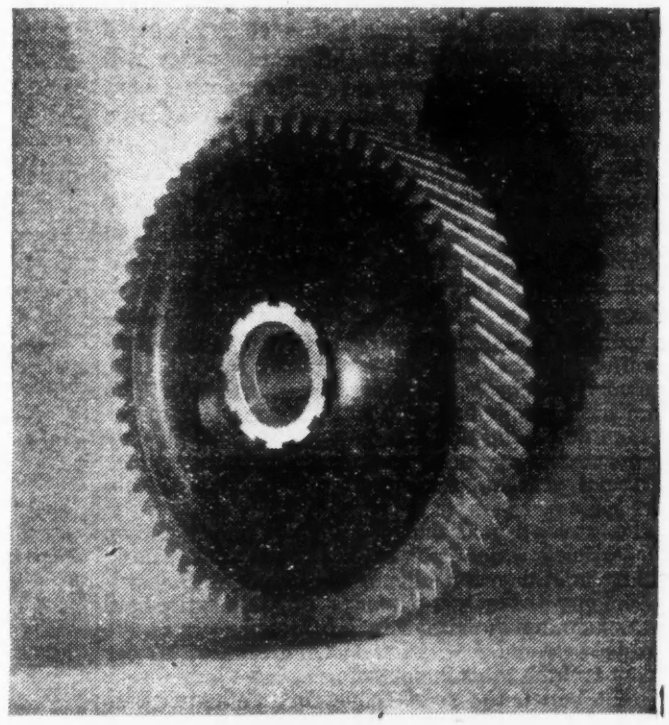
Trenton, N J., June 16.—Transfer of municipal consents held by Mrs. Bridget Mahar to John P. Mahar and Vincent A. Keil, trading as partners for the operation of a bus line on the Edgar Road route between Elizabeth and Linden, has been approved by the State Board of Public Utility Commissioners.

Many good salesmen fail to make enough Personal Contacts, because they use the "back of envelope" notation system.

"PERSONAL CONTACT" keeps in the salesman's pocket all his prospects, owners, used car and want list records. His Sales Manager can quickly and accurately direct his day's work and review yesterday's work at a glance.

Sent on approval to interested Sales Managers

HAROLD R. CARTER COMPANY
360 North Michigan Avenue
CHICAGO



PRECISE PERMANENT TIMING

TEXTOLITE TIMING GEARS

EVERYTHING wears. Nothing can prevent it. The engineer's problem is—How to minimize the effects of wear.

In nonmetallic timing gears, wear throws the camshaft out of time less than in any other type of timing drive. The effect of wear is confined to the tooth profiles in contact at any one time, and is not multiplied as in other type of drives. The average wear in a modern nonmetallic gear is less than 0.001 inch in 20,000 miles of service.

Nonmetallic gear material is 40 times more elastic than steel. Its specific gravity is less than half that of aluminum. It damps sound and vibration and has a lightness that insures the minimum of inertia effects.

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GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Automotive Daily News

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That 15 Per Cent.

IT is understood that the railways of this country will shortly make a formal plea to the Interstate Commerce Commission for the right to raise freight rates by about 15 per cent. The roads claim that with this increase they will be able to show earnings of 5¾ per cent. on their investment. Of course some roads show that return now, but others do not and some of them never have.

It is no secret that it is motor competition that has forced the railways to ask permission to increase freight rates. The increase in freight shipments by motor truck has been steadily mounting for years and has at last reached a point where it has seriously threatened the railway business. Passenger transportation by motor bus lines has in the meantime grown by leaps and bounds, further reducing the earnings of the railways.

No sane man wants to see the railways ruined. The roads are one of the foundation stones of American prosperity. On the other hand no sane man wants to see a new medium of transportation, which has proved its value and its economy in actual practice, strangled and eliminated from our transport system.

It has always been held that the field in which motor truck transportation is valuable is in short haul work. Long distance hauling is still practically in the hands of the railways. The economy of truck transport decreases as the haul increases; this sums up the situation fairly well.

We venture to wonder whether the increase of 15 per cent. in railway freight rates is not going to have a different effect from that which the roads hope for. Will not this increase tend to increase the economy of motor truck transport by just that much? Say that motor truck hauling is more economical than railway freight up to 300 miles. We are merely taking an arbitrary figure here, by way of example. If the railways increase their freight rates by 15 per cent., will not motor truck transportation then be efficient and economical up to, say, 350 miles, thus diverting a greater volume of freight from the railways to the motor trucks?

We do not advance this as any positive prophecy, but, certainly, it would seem that this is a likely sequel to the 15 per cent. increase, if this actually is granted to the railways. This whole problem of developing one form of transportation, while preventing the demise of another, is fraught with difficulty. We must find a solution for our own economic welfare.

Stopping Ride Begging

CONNECTICUT has taken drastic steps to end solicitation of rides by pedestrians on the public highways. In so far as we know, this is the first time that any state has placed a law of this kind on its statute books and the innovation may have a far-reaching effect as a precedent.

To us this law seems to meet a real need. Motorists everywhere are besieged by stray passersby with pantomimic requests for transportation. It seems to most people churlish to refuse all of these mute signals for lifts, yet all authorities agree that except in cases of accident or emergency, every such appeal should be ignored. The habit of picking up strangers has a number of dangerous angles. To begin with, the owner of the car is liable for damages in case of injury to his self-invited passenger. Then, too, the car owner has no idea what may be the character of the person who is entering his car. Many a car owner has been forced to aid escaping criminals and not a few have actually been killed by men they have picked up.

We hold no brief for multiplying laws regulating the operation of motor vehicles, but here is a law that seems to us to be definitely needed. Other states will do well to give this subject careful consideration.

Differential Discussions

IN this column Automotive Daily News is glad to present the opinions of its readers on topics related directly to the automotive industry. Automotive Daily News, however, must disclaim responsibility for such opinions. All questions regarding merchandising, technical problems or other information pertaining to automotive industry will be answered without charge in this column.

C. Edward Barnett Urges Dealers to Work for the Elimination of Trades

Automotive Daily News: It has given me much pleasure and satisfaction to read letters published in your columns on Page 4 of nearly every issue concerning the attitude I take in the matter of the factories compelling dealers to stop trading used cars, rebating or throat-cutting.

I am sure that when old heads in the business realize, as does Mr. Milton T. Elliot, proprietor of Elliot Motor Company of Suffolk, Va., the hazards confronting factories and their dealers by continuing present practices of trading, surely there are thousands of other level-headed, deep-thinking business men still in the business hoping, and even praying, for some means of eliminating used car trades. I feel as he does, that the few men in the industry who have made some money in the last twenty years are not going to be silly enough to stay in the game under existing conditions if they can get out and save part of the money they have made. Most of the dealers, however, when they check up, will find that it is physically impossible to get out of the business at the present time without sustaining tremendous loss; therefore there is only one course left to them, and that is to stay in and hope for some other method to be adopted by which they can eventually cover their losses and show a profit.

I am certain that if a sufficient number of dealers throughout the country will invest a few cents to send a telegram or night letter to the National Automobile Chamber of Commerce, New York city, indorsing a similar plan to the one suggested by me and asking for this protection, the factories would be more interested and get a better understanding of the actual field conditions among their dealers. I am confident all the factories are as much at a loss as we dealers in trying to solve the industry's financial trouble. But at present they are clinging to the idea that business is still to be had if we dealers go out after it as persistently as we should. But they fail to offer a solution to the dealers by which they can still remain in business and show a profit when they are compelled to compete with long-trading competitors who either don't know how to figure cost and overhead or fail to have an efficient accounting system by which they can record same, and thereby get a true picture of their business. We have tried everything else. We can't do any worse by trying this method, and, as far as numbers of units sold, I sincerely believe we would show an increase over present figures, for, by this method, true salesmanship and conscientious effort would bear fruit and deals be closed much easier and faster for the salesman, because he would not have to stall around for a period of two or three weeks, or maybe six months, waiting for Mr. Prospect to find out what the highest offer will be for his old car.

Sincerely hoping that every dealer who is in the business and wants to stay in the business will send a word of encouragement to the National Automobile Chamber of Commerce, I remain,

C. EDWARD BARNETT,
Barnett Motor Co., Belleville, Ill.

Favors the Barnett's Plan for Solving Used Car Problem

Automotive Daily News: On June 5, Mr. Barnett submitted a plan to the automobile factories through your Daily News, which I heartily endorse. And I am sure if the automobile manufacturers want better distributors and dealers for their products, they can have them through this plan. I feel sure that the manufacturers can get together on this plan, and I see no reason why they all should not endorse this idea. Unless some factory with a very unpopular car expects his dealer to get all of his business through over allowance on the used car. This can be corrected by building a better value or reducing the price on the car.

I feel that the new car should be divorced from the used car. When this is done, we will have the backing of all our local banks and best citizens.

J. H. McMURRIA,
Jacksonville, Fla.

COMING EVENTS

JUNE

14-19—**White Sulphur Springs, W. Va.** Society of Automotive Engineers, summer meeting.
15-18—**Madison, Wis.** American Society of Mechanical Engineers, fourth national oil and gas power meeting.
17-19—**French Lick, Ind.** Steel Founders Society, mid-summer meeting.
21—**Montlery Track, France.** Automobile Club of France, grand prize race.
22-26—**Chicago, Ill.** American Society for Testing Materials, thirty-fourth annual meeting.
22-27—**Boston, Mass.** National Association of Credit Men, convention.
29-30—**Chicago, Ill.** National Association of Taxicab Owners, meeting.

JULY

4—**Altoona, Pa.** Automobile race.
19—**Nurburg-Ring, Rhineland, Germany.** Automobile Club of Germany, grand prize race

SEPTEMBER

1- 3—**Cleveland, O.** Hotel Statler, Society of Automotive Engineers, twentieth annual aeronautical meeting in conjunction with National Air races.
8-17—**Utrecht, Holland.** Utrecht Fair, bus and truck show.
16-17—**Atlantic City, N. J.** National Petroleum Association, annual meeting, Hotel Traymore.
20-26—**Springfield, Mass.** Eastern States Exposition.
21-25—**Boston, Mass.** American Welding Society, meeting.
28-29—**Atlantic City, N. J.** National Association of Motor Bus Operators, fifth annual meeting, Hotel Ambassador.
26-Oct. 2—**Atlantic City, N. J.** American Electric Railway Association, annual meeting.

OCTOBER

1-11—**Paris, France.** International Automobile Salon.
2- 3—**Houston, Tex.** American Institute of Mining and Metallurgical Engineers, petroleum division meeting
12-16—**Chicago, Ill.** National Safety Council.
14-16—**Pittsburgh, Pa.** Society of Industrial Engineers, convention.
15-24—**London, England.** International Motor Exhibition, Olympia Hall.
22-28—**Prague, Czecho-Slovakia.** International Automobile Exposition.

NEWARK A. T. A. WILL HOLD GOLF TOURNAMENT JUNE 25

Newark, N. J., June 16.—The Newark Automobile Trade Association will hold its summer golf tournament Thursday, June 25, at the Greenbrook Country Club, North Caldwell. It will be medal play handicap, with A and B classes for the trade, and a special visitors' class for guests. Luncheon will be provided promptly at 12 o'clock and official play will start promptly at 1 o'clock. Those who want to take the whole day off may play a round in the morning and get acquainted with the course.

TAYLOR NAMED PRESIDENT PORTSMOUTH, O., A. D. A.

Portsmouth, O., June 16 (UTPS).—John F. Taylor of the Taylor Universal Motor Company was named president of the Portsmouth Auto Dealers' Association at the annual meeting held recently. He succeeded Edward Glockner, who served during the past year. Marion Schleinhege was named vice-president and Edward Glockner, Cliff Zuhars and Harry Howe directors.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

COMMON SENSE PRECAUTIONS

DEMAND SAFETY GLASS IN ALL NEW CARS

Common Sense has dictated every safety measure in traffic regulation and motor car manufacture. This is the period of refinement in automobile manufacture. The next major improvement—one that even now has gained the endorsement of more than half the automobile manufacturers in the country—will be the adoption of safety glass as complete equipment by all manufacturers.

This obvious means of eliminating the greatest remaining danger in motoring—that of broken, flying glass—is one that engineers and dealers must consider.

Libbey-Owens-Ford Safety Glass is made by an exclusive process, which produces a glass of high quality and remarkable clarity besides the priceless protection which it affords the motorist.

LIBBEY-OWENS-FORD GLASS COMPANY, TOLEDO, OHIO

Manufacturers of Highest Quality Flat Drawn Window Glass, Polished Plate Glass and Shatterproof Safety Glass; also distributors of Figured and Wire Glass manufactured by the Blue Ridge Glass Corporation of Kingsport, Tenn.

The following are users of L-O-F Safety Glass: Packard, Graham, Studebaker, Franklin, Reo, Willys, Willys-Knight and Ford. It is also used in Dietrich and Le Baron Custom Bodies, Reo Speed Wagons, Twin Coaches, Brill Trolley Buses, Cincinnati Trackless Trolley Coaches, Bender Bus Bodies, Hackney and Springfield School and Passenger Bus Bodies, White School Buses, Stinson Aircraft, Gar Wood Boats and Matthews Cruisers.

Listen to Floyd Gibbons every Sunday evening at 10:15 Eastern Daylight Time, over WJZ and associated NBC stations.

LIBBEY-OWENS-FORD SAFETY GLASS

Correct Engine Design and Suitable Fuel Required For Automotive Diesels

Major Problems of Developing High Speed Diesel Fuels Include Clean Burning and Complete Combustion and Elimination of Detonation

By W. H. BUTLER
Technologist Standard Oil Company of New Jersey, New York City

The following paper was presented at the Monday session of the summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.:

With the advent of the high-speed automotive engine, the problem of supplying satisfactory fuels took on an entirely different aspect. The design engineer early learned that the large engines could not be reduced to a miniature size and become a satisfactory automotive Diesel using the same principles of injection and combustion-chamber design as have been accepted for slow-moving engines. The same is true of the petroleum supply. Many

NOTHING

problems enter into combustion when the speed is increased and the cylinder bore decreased, and the petroleum technologist has had to adapt his ideas to many changes. Furthermore, many of our technical men have been trained to talk in terms of gasoline and gasoline engine performance. There is a greater difference between the combustion characteristics of the automotive Diesel engine and the gasoline engine than most engineers realize.

Two possible methods of obtaining satisfactory performance of high-speed Diesel-engine fuels are: (a) Proper design of the injection system and combustion chamber of the engine and (b) suitable composition of petroleum fuels for this service.

In my contact with various engineers who are designing high-speed Diesel engines I find that the Diesel engineer appreciates his responsibility with regard to the design problem, and rapid strides have been made in the last two or three years in overcoming some of the many difficulties with which the industry was originally faced.

The petroleum industry, on the contrary, has done little work in regard to the development of a special fuel for high speed Diesel engines, probably because it has not had the close co-operation of the Diesel engineers. Unquestionably the petroleum industry will develop a fuel suitable in every respect to the high speed Diesel engine when it is called upon to do so by the automotive manufacturer and confronted with the fact that a large potential market awaits the petroleum supplier who will supply a fuel suitable in all respects for this particular use.

Major problems of developing high speed Diesel fuels may be listed as follows:

1. Clean burning and complete combustion (a) smoke (b) odor (c) dilution.
2. Detonation (a) combustion lag (b) ignition.

Regarding the first of these, it is needless for me to dwell on the difficulties encountered, due to incomplete combustion, namely, sticky valves and piston rings, frozen pistons, crankcase dilution, and innumerable difficulties which result in very unsatisfactory operation.

Any appreciable amount of odor and smoke from a Diesel engine would be prohibitive for urban operation of motor coaches and motor trucks. Fines might result from the use of offensive vehicles, and the public health authorities probably would force offending vehicles off the street. Exhaust gases from the types of fuel that are satisfactory for Diesel engine operation leave a more pungent odor and a more disagreeable effect upon the sensitive membranes of the human body than do the products of combustion of gasoline, so it is essential that smokeless operation be approached more nearly with the Diesel engine than with the spark ignition engine.

E. T. Vincent, in his paper before this society in January, stated that knocking in a Diesel engine has no deleterious effect on the engine, and that the power curve is not affected. We are not entirely convinced that these are facts, and we know that combustion noises must be eliminated for psychological reasons, since a tremendous amount of technical and non-technical data on the subject of detonation has been published, with the result that the public is sold on knockless fuels. Consequently it would be necessary to either undo all of the previous propaganda or supply a detonation free oil for the operation of Diesel engines.

ROLLS

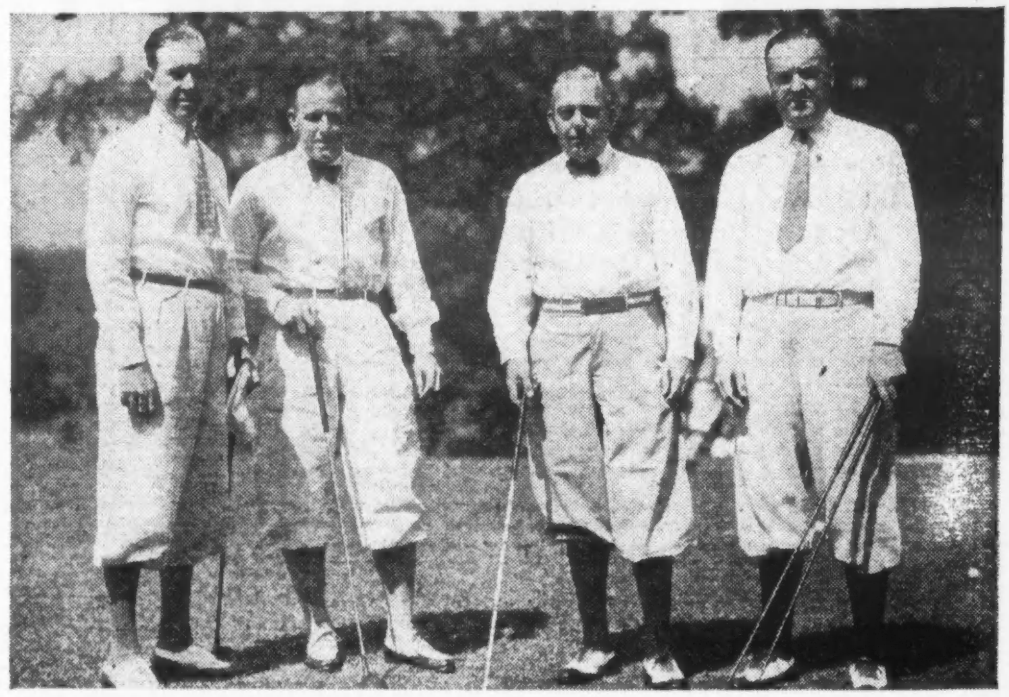
Some engineers contend that raising the compression pressure eliminates detonation. It has been stated that a compression pressure of 700 pounds per square inch will eliminate any possibility of noises accompanying combustion. It seems to me that such pressure, although practicable, would not be economical and would considerably increase the weight of the engine, which would be a disadvantage in competition with gasoline equipment. The possibility of preheating the intake air to secure a higher temperature of the compressed charge seems more practical than the increase in compression pressure, as the ignition lag would naturally be proportionately decrease in temperature, because of the more rapid absorption of heat by the tiny globules.

The possibility of catalysts or ignition oils is one which deserves considerable study. One of these might very readily be the solution to the problem. Any good distillate oil with its ignition lag reduced by the addition of the catalysts would possibly be a satisfactory Diesel-engine fuel. The Germans have done considerable experimental work with coal-tar products, which have very high spontaneous ignition points. In their experiments they have injected 5 per cent. of ignition oil into the cylinder immediately preceding injection of the coal-tar product, thus assuring combustion.

Detonation we feel to be a term that is not properly applied in this sense, but it is used in this paper because even the layman knows that the word means knocking during combustion. This phenomenon in the Diesel engine is far different from what is commonly known as

(Continued on Page 9)

Snapped at S. A. E. Summer Meeting



ABOVE ARE (left to right) E. L. Vail of New York, Jaeger Watch Company, Inc.; E. J. Cosgrave, Detroit; F. H. Martin, Detroit, Stewart-Warner; Sandy Brown, New York, Bakelite Corporation

Discussion of Fuel Papers Shows Progress of Industry

(Continued from Page 2)

it is probably satisfactory. If it doesn't pass we don't know anything about it. I know very well that the copper dish method can be made as reproducible as we want to make it, yet the copper dish test has nothing significant."

Chairman Beall: "It is final. We had better not try to carry on. Anyone else? Our next paper may not be controversial, but I think it ought to be. It seems to be a subject that the oil people at last feel rather strongly on. Our speaker has no bias, and I believe he is simply going to describe last year's and this year's situation. After that we ought to have some controversial discussion. I hope it will not provoke a real argument. The subject of vapor lock has interested us in

LIKE A

the last few years, and still interests us. I will ask Dr. Bridgeman to present his discussion on vapor lock."

Dr. Bridgeman presented a summary of his prepared paper.

Chairman Beall: "If Mr. Bridgeman's survey of the eight or ten cars, '31 models, that he has worked on is indicative of the class there isn't much improvement in '31 or 1930. Bearing in mind in preparing a gasoline the oil refiner has to supply reasonable starting, we still have the problem with us of evading vapor lock and supplying gasoline that will occasionally start the engine in just cool weather, not cold weather."

Ludlow Clayden, Sun Oil Company: Mr. Oberfell's paper shows, although he did not phrase it that way, that if you study that data you will see that if you make one gasoline which will be satisfactory for the worst car in Dr. Bridgeman's analysis from the vapor-locking point of view ,and you make another gasoline which will be satisfactory on vapor lock for the best car, then that second gasoline will give you the same degree of starting at zero as the other one will give you between 50 and 60 degrees. F.

"There is an enormously important difference. There is another thing which I found some of my friends in the automobile industry do not seem to appreciate, and that is that vapor lock is not entirely a summer problem. Whereas, the figures given by Dr. Bridgeman are based on so many degrees above atmosphere, it by no means necessarily follows that those relationships hold true for any atmospheric pressure.

"I mean that at an atmosphere of, let us say, 70 degrees, the rise in the particular fuel system might be 40 degrees above that atmosphere. But if your atmosphere were zero you might find that the rise was considerably more than 40 degrees above the atmosphere. That depends upon where the critical point is.

"But since the temperature of the car plant as a whole under normal operation does not vary a great deal in summer and winter temperature, and since the temperature in some of the fuels is caused by proximity to the engine, the variation between summer and winter of your fuel line maximum will not be nearly as great as the variation between summer and winter in your atmosphere.

"There were strong economic reasons why the petroleum industry

BALL

should like to put out the lowest possible volatility gasoline, a few years ago. Today that is not the case. I believe that most anybody in the industry would very much rather make practically the same gasoline all the year around and cut out the trouble that arises from having two or three specifications. All of this can be done if only the average of our cars can be made as good as the best example found by Dr. Bridgeman."

W. S. James, Studebaker Corporation: "It seems to me rather peculiar that at this time the automobile engineer is asked to take the heat off. I don't think there is any question but that fuel line temperatures should be kept down. Probably the difficulty arose with the advent of the fuel pump. When the fuel pump was put in, then the vacuum tank was no longer in a position to distill off the light ends and they had to be forced through the pump.

"The problem of fuel vapor lock I don't think can be answered entirely by the automotive engineer in what he builds in the next two years. I think the petroleum manufacturer will have to assume a certain responsibility until cars have been changed over or until service corrections can be applied to cars in the field. I think that one thing the automotive engineer would very much appreciate knowing is what is the average vapor locking temperature, or what is the vapor locking temperature of the average gasoline being marketed, and what is the maximum and minimum."

There was considerable discussion following **W. H. Butler's** paper on Diesel fuels. **A. Ludlow Clayden of Sun Oil** was called upon by **Chairman Joachim** to comment on the paper, which he did, in part, as follows:

"This is a very difficult subject to discuss because it is so terribly involved. There is one point which I think cannot have too much emphasis because it is so liable to be lost sight of. That is, that we have not got anywhere near perfect small Diesel engines. In fact, the small Diesel engine is probably no further advanced in development than the automobile gasoline engine was twenty or twenty-five years ago. Possibly it is a little closer than that, but I doubt it. Any decisions that we make regarding the necessary qualities of fuel, if they are based on the engines that we have, are liable to be restrictive in the development of engines."

OPENS NEW TIRE SERVICE

Lincoln, Neb., June 16.—Phil R. Teal has opened a new tire service and auto repair establishment at 17th and Van Dorn Streets, operating under the name of Teal's Auto Shop and Tire Service.

NEW DEPARTURE BALL BEARINGS

Synthetic Oils Less Susceptible to Viscosity Changes With Temperature

Wide Range of Viscosity Characteristics Possible by Polymerizing Different Olefins With Condensing Agent; Deals With Two Oils Synthesized Commercially

By F. W. SULLIVAN, JR., VANDERVEER VOORHEES, P. T. OAK and D. P. BARNARD
Standard Oil of Indiana, Whiting, Ind.

The following is a paper to be presented today before the summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.

For several years past the laboratory with which the writers are connected has been conducting a fundamental investigation of the composition of lubricating oils, particularly as it affects the viscosity characteristics of the oils. One method employed in this work has involved the synthesis of viscous lubricating oils from a variety of olefin hydrocarbons of different structure. In brief, it has been found that lubricants of an extremely wide variety of viscosity characteristics can be prepared by polymerizing different olefins by means of a condensing agent such as aluminum chloride.

THE FIELD FOR SYNTHETIC LUBRICATING OILS

TABLE 1—Polymerization of Pure Olefins

Olefin Polymerized	Viscosity of Product 100° Fahr. (37.8° Cent.)	Viscosity of Product 210° Fahr. (98.9° Cent.)	Yield Weight of Olefin Per Cent.	Viscosity Index*	Gravity Deg. A. P. I.	A.S.T.M. Solid Deg. Fahr.
Ethylene (C_2H_4)	2,769	80	....	—137.0	18.8	20
Propylene (C_3H_6)	1,083	70	33.3	20.4	33.1	—15
Butene-1 (C_4H_8)	1,654	92	....	50.4	34.3	—15
$CH_3=CH-CH_2-CH_3$	1,122	78	46.4	....	....	....
Butene-2 $CH_3-CH=CH-CH_3$	1,507	81	33.3	21.3	34.7	—10
Isobutylene	3,706	147	42.0	67.5	....	....
$(CH_3)_2C:CH_2$	1,540	94	....	....	32.5	—15
	868	73	....	....	....	....
Pentene-1 (C_5H_{10})	1,350	94	59.8	82.6	....	....
$CH_3=CH-CH_2CH_2-CH_3$	1,180	89	....	....	33.2	—20
Pentene-2	1,946	93	38.5	27.4	32.6	— 5
$CH_3-CH=CHCH_2-CH_3$	976	68	53.0	....	....	....
3 Methyl Butene-1 /CH_3	3,301	109	50.8	0.0	34.0	0
/CH_3	938	65	....	....	....	....
$CH_3-C-CH-CH_3$	321	50	....	....	....	....
2 Methyl Butene-1 /CH_3	1,959	89	34.5	11.7	33.7	0
$CH_3-C-CH_2-CH_3$	998	68	....	....	....	....
Trimethyl Ethylene	1,476	70	....	—74.5	31.0	20
$(CH_3)_2C:CH(CH_3)$	367	49	29.3	....	....	....
Hexene-1 (C_6H_{12})	1,155	92	....	91.1	34.3	—30
Octene-1 (C_8H_{16})	905	88	....	104.0	34.8	—25
Cetene ($C_{16}H_{32}$)	1,774	201	85.0	138.0	33.9	40
	1,187	153	....	....	34.8	40
	717	108	....	....	35.9	35
Cyclohexene (C_6H_{10})	2,135	85	....	—27.6	18.0	20
Pinene (turpentine) ($C_{10}H_{16}$)	4,750	83	....	—324.1	15.8	25

*The viscosity index (see Dean and Davis, 21) of each oil was calculated for viscosity of 85 at 210° Fahr.

Table 1 gives some idea of the variety of products obtained by this process, depending upon the starting material. In this table viscosity-temperature characteristics have been expressed in terms of the Dean and Davis viscosity index in which the temperature coefficient of viscosity of a purely paraffinic type of oil is designated as having a viscosity index of 100 and that of a purely asphaltic type of oil, zero.

Fig. 1 illustrates the viscosity-temperature characteristics of several typical oils as plotted on the MacCoull chart. The effect of viscosity index on the low-temperature limit of oils having the same viscosity at, say, 210 deg. Fahr., is clearly shown. The curved lines of the paraffin-base oil illustrates the effect of incomplete removal of wax upon its apparent viscosity. This cold-test effect is chiefly responsible for channeling and has a rather marked influence on resistance at the lower shearing stresses in general. An index of more than 100, therefore, indicates an oil that changes in viscosity with temperature less rapidly than does a Pennsylvania oil, while a negative index shows greater temperature susceptibility than is possessed by a Texas-type oil. Obviously, the higher index values indicate more desirable viscosity temperature characteristics.

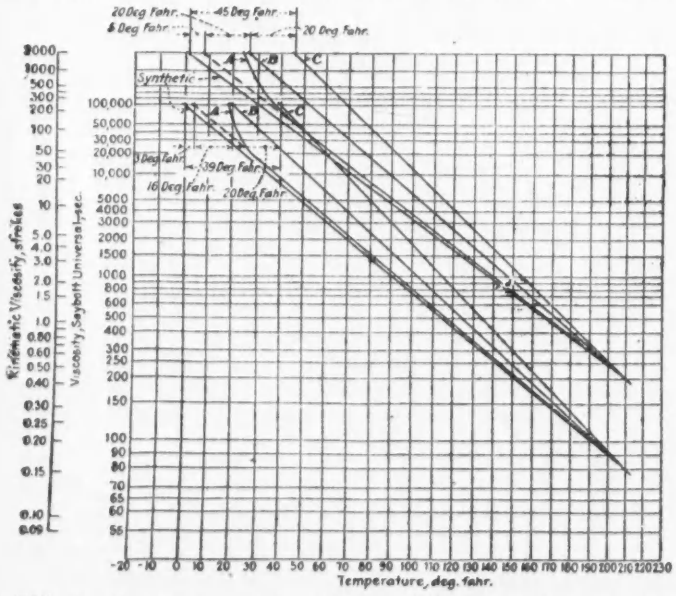


FIG. 1. Viscosity temperature characteristics of synthetic oil and several typical oils as plotted on the MacCoull chart

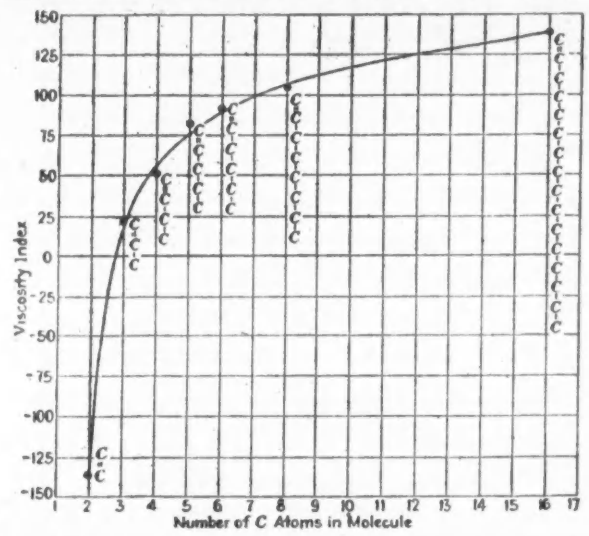


FIG. 2. Effect of saturated chain length upon the viscosity index of oils synthesized from hydrocarbons of increasing molecular weight

It will be noted that the relatively long-chain hydrocarbon cetene, produced the best results from this point of view, while ethylene, the smallest molecule, polymerized the worst. Figs. 2 and 3 strikingly illustrate this effect. Apparently, finished oils having the longest straight chains and a minimum of branching are the most desirable. Further development of this work has shown that materials available in quantity at the refinery may be employed for the synthesis of high-quality lubricants.

While the raw materials employed and the complicated method of manufacture make these synthetic oils inherently more expensive than is permissible for ordinary motor oils, many special conditions of service exist in automotive practice where temperature - viscosity characteristics of lubricants are of major importance and higher cost is not a serious obstacle. In particular, transmission and steering mechanisms, which must respond to the application of human effort, and shock absorbers of the hydraulic type are especially susceptible to viscosity changes. The performance of the internal-combustion engine is, to a less degree, dependent upon viscosity-temperature and cold-test properties, particularly as regards cranking in cold weather. The following summary presents some of the data obtained by the laboratory mentioned on the influence of viscosity on the behavior of some of these units and

(Continued on Page 8)

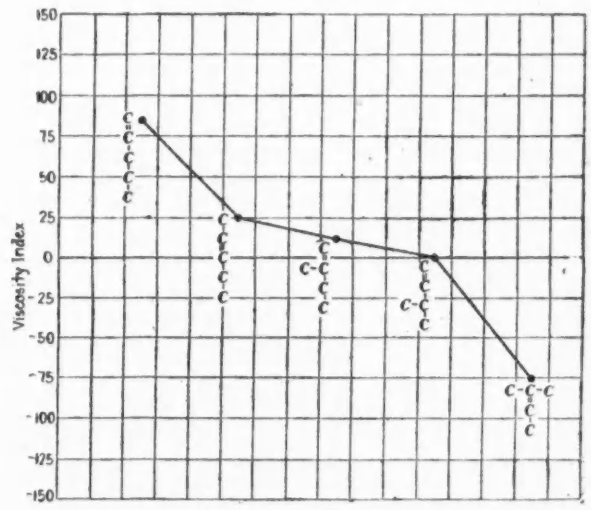


FIG. 3. Effect of interruption of the saturated chain linkage upon the viscosity index of oils synthesized from isomeric hydrocarbons

Characteristics of Synthesized Oils

Within the last two or three years many thousand gallons of synthetic lubricating oils have been made from the olefins produced by cracking paraffin waxes. The processes involved have been described in detail in a recent paper by two of the authors of this article. For the present purpose it will suffice, therefore, to present the inspection characteristics of two representative oils, as described in Table 2, that have been synthesized by this method in commercial quantities. It will be noted that the viscosity index is better for these oils than for any natural oil and yet the pour tests, which are characteristically high for natural oils of good viscosity indexes, are lower than for any natural oils of similar viscosities.

TABLE 2

Physical properties of synthetic oils made from paraffin wax.

	Oil Number 4,530	Oil Number 4,555
Gravity, deg. A. P. I.	30.6	29.7
Flash-Point, deg. F.	*515	†615
Pour-Point, deg. F.	‡—20	§0
Viscosity:		
Saybolt universal sec. at 100 deg. Fahr. (37.8 deg. Cent.)	850	3,250
Saybolt universal sec. at 210 deg. Fahr. (98.9 deg. Cent.)	85	197
Viscosity Index	102	102
Color, N. P. A.	2	2½
Conradson carbon, per cent.	0.13	0.4
Sligh oxidation, mg. sludge per 10 gm. oil.	1.8	2.8

*268 degrees centigrade.
†324 degrees centigrade.
‡—28.9 degrees centigrade.
§—17.8 degrees centigrade.

N. J. INDUSTRIAL HEADS IN SIXTH CONFERENCE HEAR CANDEE, HUTTON

Andover, N. J., June 16.—"The Foreman and Industrial Relations" was the theme of the sixth annual New Jersey indutsrial conference at Camp Waywayanda, near here. Nearly 150 delegates attended. George P. Ehrhart of Passaic is general chairman of the conference. Glen Gardiner of Little Falls is chairman of the discussion periods.

Q. J. Schwartz of the United States Cork Company of Lyndhurst presided this afternoon. Seth Candee, director of personnel for the Tidewater Associated Oil Company, spoke on "Trends in Industrial Relations." After the session the delegates engaged in sports and hikes.

The evening theme was "Foremen and the Promotion of Industrial Relations." I. J. Hutton, head of the industrial relations department of the Standard Oil Company, spoke in favor of old age pension and against the theory that men past 40 were not as productive as younger men.

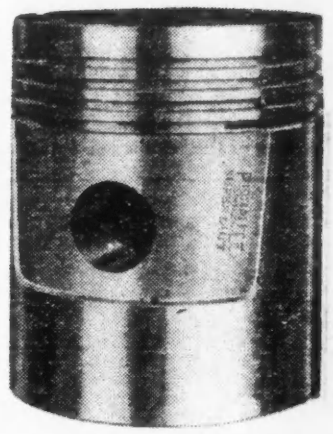
"Human Relations and Industrial Progress" will be the subject of tomorrow's session at 9 a. m., over which M. J. Kane of the American Telephone and Telegraph Company will preside. G. F. Walters of the Oiline Refining Company of Newark will preside over the 11 a. m. session, at which the Rev. David Van Strien of Woodcliff will speak on "Industry Leads, but Whither?"

ALUMINUM INDUSTRIES DISPLAYS NEW PISTON AND VALVES

The new Permite super-duty piston, one of the outstanding developments of the Aluminum Industries, Inc., is expected to attract much attention from engineers attending the annual meeting of the Society of Automotive Engineers now in session.

The new piston has as its outstanding feature simplicity of design, being the full trunk type, with no slots on the major thrust face. This, is, claimed, promotes uniform heat radiation and permits an even distribution of metal to all points, obviating the necessity of localized heavy sections to secure sufficient strength.

The major thrust bearing face presents considerably more bearing



PERMITE super-duty piston

contact than the minor thrust face. Reduction in friction is said to result from the comparatively small bearing contact of the minor thrust face.

Expansion control is obtained by a top annular slot, located in the last groove, in connection with the vertical slot in the center of the minor thrust face from the top annular slot to the open end of the skirt. The top annular slot also functions in the capacity of an efficient oil drain.

Location of the top annular slot in the last ring groove also increases the contacting area of the minor thrust face. A material reduction is effected in head operating temperature, it is claimed, as practically 75 per cent. of the ring belt is in contact with the skirt.

Field tests, completed with nationally recognized bus and fleet operators throughout the United States, have demonstrated the efficiency and long life of the piston.

Engineers in automotive and affiliated fields also are interested in Permite diachrome exhaust valves developed by Aluminum Industries, Inc., in collaboration with a prominent steel manufacturer.

One of the prime requisites in exhaust valve steel, and which is claimed to be inherent in the new diachrome product, is high heat resistance.

NEW 'WYCO' FLEXIBLE SHAFT KIT

A low-priced flexible shaft kit has recently been placed on the market by Wyzenbeck & Staff, Inc., Chicago, Ill.

The outfit includes a ¼-horsepower 60-cycle alternating current motor, with built-in switch, 4-foot flexible shaft, 6-inch flexible sanding disc, 4- and 5-inch buffing wheels, 4-inch scratch brush, 4-inch emery wheel, ¼-inch drill chuck, wheel arbor, wrench and 10-foot electric cord. Standard mounting is a swivel type tripod base, with 12-inch tool tray; extension base, 22 inches high, can be furnished.

S. A. E. Personalities

By WILLIAM C. CALLAHAN
News Editor

Summer meetings may be lots of fun and golf for some of the members of the S. A. E., but they mean plenty of work for the officers and chairmen of committees. Vincent Bendix, the president, who arrived early yesterday morning, was immediately whisked into a counsel meeting which held him indoors the greater part of the day.

* * *

John A. Warner, secretary and general manager of the S. A. E., set a new record for freak golf scores. Playing in a foursome on the No. 1 course Sunday afternoon he went out in 61 and came back in 43 without using a wooden club throughout the play. No one has been able to account for the wide difference in scores.

* * *

Theodore Lunt Preble, sales manager of the S. P. A. Truck Corporation, Pierce Arrow division, Buffalo, is not at the meeting because Roger Henry Preble, Jr., arrived June 6. Roger Henry is slated for membership in the S. A. E. in the next eighteen or twenty years.

Guy Motz of the Detroit S. A. E. has proved himself a lone rider of the summer meeting. After two days of Guy's equestrian activities, the riding master has consulted W. J. Joachim of the Westinghouse Electric and Manufacturing Company on the advisability of installing electric horses.

* * *

Griscom Pettle, publisher of the Daily S. A. E., which is being so ably sponsored this year by the E. G. Budd Manufacturing Company and Budd Wheel Company, is having plenty to do. He is trying to get out the S. A. E. under the handicap of printing in a plant thirty miles away. In spite of this, Gris has been giving up-to-the-minute coverage with complete golf scores day by day. This cost lots of sleep.

* * *

Joe Anglada of the Anglada Motor Corporation, New York city, found himself in a tight fix while motoring into White Sulphur Springs and while coming down hill found that his brakes had disconnected. Fortunately there was a soft clay bank beside the road. Joe sidled his car in motor boat fashion which slowed him up enough to get into second speed. The remainder of the hill was negotiated in this second with a sigh of relief at the bottom.

* * *

That suit of mail which adorns the novelty shop in the basement may go to A. W. Anderson of Borg & Beck, chairman of the golf committee. Andy made an initial bid for scrapiron undies after being smacked by a golf ball during a fearsome foursome.

* * *

The meeting here Monday night was all wet, due mostly to the water carnival, which played to a great gallery. Gordon Brown of Bakelite proved one of the star performers.

* * *

Mr. and Mrs. L. A. Charminade of the Studebaker Corporation seem to have quite a monopoly on skill on the archery ranges. This Robin Hood stuff is apparently quite a hobby with the Charminades, but archery has increased the sale of arnica to novices.

* * *

Mrs. Stanley Whitworth, wife of Stanley Whitworth of Bendix is having a busy time as chairman of the women's golf committee.

A CORRECTION

In our list of "New Dealers Appointed," Automotive Daily News issue of June 12, we noted the appointment of the J. A. Jensen Auto Sales, Inc., Bronx, New York city, as an Auburn dealer. The J. A. Jensen Auto Sales has written us to the effect that it has been an Auburn dealer in New York since 1918 and it is its belief that it is today the oldest Auburn dealer in the United States. Our apologies to this company, and have we any challengers to its title as oldest Auburn dealer in the country?

MARMON GETS ADDED WORKING CAPITAL IN FINANCING PROGRAM

(Continued from Page 1)

the Marmon Motor Car Company to provide additional working capital, it is announced today by G. M. Williams, Marmon president.

"These new arrangements with has produced a sizable number of dors place the company in an excellent position to take immediate advantage of the unusual demand for the new Marmon sixteen and to proceed with comprehensive plans for the future," Mr. Williams said.

"Although the company already has produced a sizeable number of Model 16 cars, it has maintained a satisfactory order position and has on its books unfilled orders for this model, with a retail value of approximately half a million dollars' production and shipments of the "16" as well as of the company's two lines of eight-cylinder models, are being maintained in direct relation to the demand."

The new financing arrangements follow closely on the heels of the announcement that the company has reduced overhead expenses to the point where operations are profitable in spite of a curtailed output.

ANTICIPATE $18,000,000 N. J. GAS TAX REVENUE

Trenton, N. J., June 16.—The anticipated annual revenue from the gasoline tax was placed at $18,000,000 a year when the Legislature increased it last year. The report of the state auditors this week shows that receipts from that source for the months of February and March this year were $3,384,541, that ratio, if continued, would indicate an annual income from the tax of $20,307,246. This would probably be further increased due to the fact that February and March are not peak months in the use of gasoline.

METHER-RASMUSSON PLAN SERVICE STATION ADDITION

Cedar Falls, Ia., June 16.—Mether & Rasmusson, garage and service station owners, have purchased property adjoining their present holdings, and plan to use the ground for an addition.

HANCH SEES POTENTIAL U. S. DEMAND OF OVER 5,000,000 NEW CARS

(Continued from Page 1)

the beginning of the year, 4,519,000 were made in 1929. At the beginning of this year there were more 1928 and 1926 cars in use than 1930 models. Among cars of vintages earlier than 1919 there were 92,000 still running. There were still in existence 1,643,000 of the 1923 models and 1,647,000 of earlier make. Practically all cars manufactured before 1927 are obsolete and many of them should go to the junk yard.

"While they are still running, practically all the cars manufactured before 1925, a total of 5,126,000, are so out of date that they ought to be replaced," said Mr. Hanch. "The owner of every one of these cars is a potential customer for some kind of a more modern car. Therefore, there is a potential demand for more than 5,000,000 cars in the United States right now. I doubt if there is a single one of these car owners who is not dreaming of the day when he can purchase another automobile."

TORREY, FRALICK AND SIMMONS
GEOLOGISTS AND PETROLEUM ENGINEERS
BRADFORD, PENNSYLVANIA

December 19, 1930.

The Visco-meter Co.
315 Grote Street,
Buffalo, New York.

Gentlemen:

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Yours very truly,
Paul D. Torrey

Paul D. Torrey:HN

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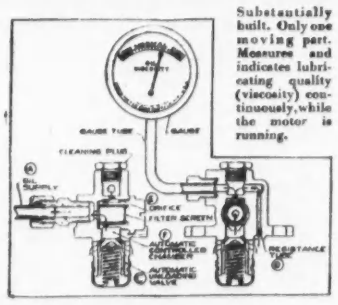

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Chase Presents Case for Rear Engine Mounting

Advantages Claimed: Compact Grouping of Mechanism; Elimination of Heat, Odors, Noise, Streamlining; Better Balanced Engine; Mechanical Accessibility; More Comfort

By HERBERT CHASE
Consulting Engineer, Forest Hills, N. Y.

The following is a paper to be presented today at the summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.

Why should the engine be placed at the front of the automobile chassis? This is the question that many automobile engineers are asking today. When we think that such an arrangement in most cases makes it necessary to position the steering-wheel almost midway of the vehicle, thus leaving the rear half only for passenger and baggage space, the absurdity of current designs becomes apparent, assuming that a better disposition of the power unit is at all possible.

Lest anybody conclude that, regardless of its length, an engine will occupy the same proportion of chassis length whether placed in front or at the rear, let it be said that this is not necessarily the case. Even a long engine can be placed transversely at the rear without serious difficulty and will then occupy only a small fraction of the wheelbase. Moreover, a variety of cylinder arrangements that cannot be employed under a normal hood in front is quite feasible in a rear-mounted engine. Before going into details, however, it may be well to list the other advantages that result from placing the engine in the rear. These include:

1. Grouping all mechanism at the rear gives the body engineer a freer hand than with any conventional arrangement.

2. All odor and heat and much of the noise that normally are carried back toward the passengers are carried away from them when the engine is in the rear.

3. A much better streamline form of the complete vehicle becomes possible.

4. A more compact engine with better balance is possible.

5. All power-developing and power-transmitting units can be placed relatively close together and lubricated from a single pump.

6. All mechanical parts become more easily accessible and can be placed at a more convenient height to work upon without reaching over fenders and without disturbing the body.

7. No long propeller shaft is needed.

8. The ordinary heavy chassis frame can be dispensed with in favor of a lighter frame, which, if desired, can be built integral with the body. In either case, a material saving in weight is possible.

9. Besides permitting a much larger seating space, the driver's seat can be placed where vision is decidedly less obstructed and where the driver can see the road much closer to the car than at present.

10. Many fittings, such as tires and headlamps, which at present tend to preclude a clean external appearance and make the car harder to wash and polish, can be readily placed under cover and still be readily accessible.

11. Improved riding qualities are readily obtainable.

Surely, if all or even a large part of these advantages can be realized in a single design, the proposed change is well worth while. If it be objected that the change is too radical to be considered seriously in the present state of the industry, my response is, first, that very few if any new units are essential, only their relative positions are changed; and, second, that if the change is indeed radical, it may for that very reason prove a great boon to an industry which has initiated relatively few major changes for many years and should have something really new to offer to its customers.

It is not contended that any large part of the automobile industry's output should be converted without a trial period, but rather that the proposed change should be tried on a modest scale until its acceptance by the public is assured. Moreover, the proposed change need not work a radical departure in the general appearance of the car. If rear engine mounting gains general acceptance, a marked change in appearance surely will result in time; but a gradual change, probably with a false hood in front at the start, is a feasible alternative for those who do not favor going the whole distance in a single jump.

Having thus stated the case for rear-engine mounting, reasons for the advantages claimed may be set forth and certain proposed layouts may be discussed.

Mounting the engine transversely in front is not feasible. It cannot be made very wide without involving an ugly hood and perhaps restricting the maximum steering lock. In consequence, the engine has become so long that only the rear half of the chassis is useful for body and luggage space, and the car is unnecessarily long and heavy for a given passenger load. If placed in the rear the engine need occupy no more than one-half as much of the length of the chassis as it now requires. Therefore, the space of the body is increased by about 50 per cent. Moreover, removing the gearset and propeller shaft from under the body proper eliminates other present limitations. As a result, the body designer can arrange seats and other body parts almost as he pleases and can make many very desirable changes in body appearance and comfort.

By means of a scale model D. H. Montgomery has shown that a chassis having a wheelbase the same as that of a Ford, with the engine placed transversely at the rear, allows as much space for passengers as there is in a conventional Lincoln seven-passenger sedan. This indicates what can be accomplished with one of several possible arrangements. It is evident that the body designer can obtain far better results when the engine is placed in the rear than when it is in front. Besides better interior arrangements much better streamline forms of body are possible than have been developed commercially for cars having the engines in front.

That reduced odor, heat and noise are possible with a rear-mounted engine seems almost too self-evident to require comment. Forward motion tends to carry all three away from passengers, and excellent insulations between engine compartment and body should not be at all difficult to arrange.

An opposed-cylinder engine, affording perfect balance and compact arrangement, is feasible when placed in the rear. Such an engine can be mounted inside the frame or just above it and need not be inaccessible; moreover, a satisfactory drive can be arranged with the engine placed in almost any desired position in relation to the rear wheels. The next arrangement of the engine, in order of preference, is probably an eight-cylinder V-type engine with its axis fore and aft. Such an engine is only slightly less compact than an opposed eight, is almost as well balanced, and has the advantage of being a well-developed type.

Even an eight-in-line engine can be employed if placed transversely, without occupying a large part of the wheelbase. Such an arrangement involves some problems in designing a satisfactory drive, but these are by no means insoluble. An eight-in-line engine is placed longitudinally, back of the rear-wheel axis, in the design of Sir Dennistoun Burney. The weight distribution is far from ideal with such an arrangement, and there is little to recommend it except that it affords exceptional accessibility of the engine.

Numerous other types and arrangements of rear-mounted engines have been tried or suggested. In all those with which I am familiar, save one, which involved a propeller-shaft driving to a front axle, the engine, gearset and differential housing have been placed close together, usually in a single compact unit. This arrangement affords an excellent opportunity for lubrication from one pump and forms an assembly that is easily adapted for quick removal. The major units of such an assembly are more easily gotten at than are corresponding units in conventional cars; reaching over the fenders or working inside or underneath the body is unnecessary.

Long propeller shafts are dispensed with. Two transverse propeller shafts have been thought necessary in most of the designs thus far developed and the wheels are usually sprung independently, but neither of these features need be cause for concern, and the latter ought to prove a distinct advantage. It is not essential, however, to employ independently sprung wheels. A conventional axle can be used if thought desirable, especially if the engine is horizontal, or an offset tube can be made to serve as an axle, as in old De Dion practice.

The chassis frame can be lightened materially when all the mechanism is placed at the rear, especially if the body and frame are made integral or are designed as a truss as in some of the rear-engine cars already built. Such construction involves decided departure from conventional American practice, but it is quite in line with aircraft construction and a logical step in the decrease in weight so long predicted by one school of automobile engineering. Even without uniting the body and frame in one integral structure, weight can be saved through the better disposition of metal than is possible in the frame and other parts of a rear-engined chassis, especially when independent wheel springing is adopted. In addition, much weight saving is possible because a car with shorter wheelbase is possible for a given passenger capacity.

With a front hood eliminated and the driver's seat well forward, it is quite evident that the driver will command a far better view of the road ahead than in present cars. He also should have good rear vision if care is exercised in placing rear windows.

Space for passengers and luggage is greatly increased because the engine occupies less space fore and aft than heretofore; and it can be further increased if the body sides are brought out flush with or somewhat beyond the wheels, as seems logical, and the wheels are recessed into the body. As the seats will not be placed between the wheels, rear seat width will not be limited by the wheel houses. Front seats also can be widened.

Such an arrangement of the body not only makes for pleasing external appearance but affords room for spare tires and wheels inside the enclosures, thus concealing parts that interfere with keeping a clean exterior and promoting a streamline flow of air along the sides of the body.

That cars such as those described will afford greater riding comfort can hardly be doubted. In the first place, all seats will be within the wheel base; none will extend beyond the wheel axes. Secondly, the added body space will make for comfort; and, since the floor can be low, a low top can be employed and still maintain ample inside body height, more in fact than is possible in present day cars. This too, will add to comfort, especially when entering and leaving the car. Finally—if wheels are individually sprung, as I believe they should be—the low unsprung weight and other advantages of springing wheels individually will certainly assure much easier riding than conventional cars afford. It is well to remember, however, that it is not essential to have independent wheel springing if through axles are preferred.

This, briefly, is the case for rear engine mounting. I shall make no attempt here to go into details of construction, but a few of the more important considerations involving general layout will be treated briefly.

Opinion differs as to the best location of the engine in reference to

(Continued on Page 10)

Synthetic Lubricating Oil

(Continued from Page 6)

illustrates the position occupied by the synthetic lubricating oils.

Influence of Oil Viscosity in Transmissions

An investigation of three transmissions having widely different design characteristics showed that shifting resistance, except in the case of oils chilled far below their pour-points, was dependent only upon oil viscosity at the temperature in question, as illustrated in Fig. 4. When greases were employed, the soap apparently had little or no effect on shifting resistance, although it profoundly influenced the tendency to channel.

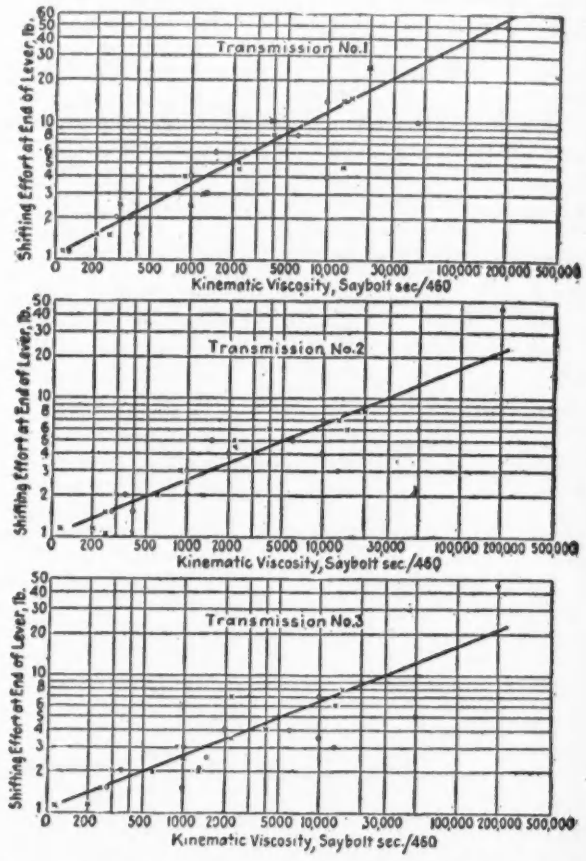


FIG. 4. Shifting resistance of three transmissions of widely different types, with various lubricants having different viscosities at the temperatures of operation

TABLE 3—Limit of Viscosity for Easy Gear Shifting

Transmission No.	Type	Maximum viscosity permitting 2-inch shift with 3-pound effort. Poises
1	Sliding gear.....	700
2	Syncromesh.....	1,400
3	Internal gear, four-speed.....	1,400*

*The limit for this transmission is based on the shift from third to fourth speed.

To establish some basis for comparing the shifting characteristics of various lubricants, an arbitrary limit for easy shifting was chosen. This specified that the shift from second to high-gear positions must be realized in two sec. with an effort of three pounds at the end of the lever. The requirement of more effort or longer time to effect the shift was considered objectionable interference with manipulation of the gear set. It was found that, regardless of the actual temperature, the viscosity limits for the three transmissions were as given in Table 3. The lowest temperatures at which various typical gear lubricants will permit satisfactory shifting in these three transmissions are shown in Table 4.

It should be pointed out at this time that these data apply to oils of relatively low pour-points, as the presence of excessive quantities of wax will interfere to some extent with shifting. Pennsylvania oils are not included, as their usual high wax content makes viscosity alone of insignifacant importance at low temperatures, the characteristics being primarily those of plasticity due to the wax. Oils at temperatures appreciably below their pour-points invariably channel badly. Therefore it is impossible to make a direct comparison between oils of high wax content and the synthetic oils which show no plastic effects whatever, even though their viscosity-temperature characteristics be not far different. Incidentally, Table 4 illustrates some of the advantages to be realized in classifying the viscosity-temperature characteristics of oils on the basis of temperatures at a fixed viscosity point, rather than the reverse system, which is more generally employed. A method of indexing oils on a temperature

(Continued on Page 10)

TABLE 4—Lowest Temperatures at Which Various Lubricants Will Permit Satisfactory Gearshifting

Oil	Viscosity, in Sec., at Deg. Fahr. 100	130	210	Viscosity Index	Temperature, in Deg. Fahr., for 3-Lb. Shifting Effort in Transmissions No. 1	2	3
Synthetic	3,500	1,250	200	102	18	11	11
B	5,000	1,580	200	81	34	25	25
C	12,500	2,540	200	32	57	50	50
Synthetic	2,300	930	160	106.5	11	3	3
B	3,800	1,180	160	71	29	20	20
C	8,500	1,800	160	42	52	45	45
Synthetic	1,610	640	120	100	5	—2	—2
B	2,100	770	120	78.5	18	11	11
C	4,300	1,140	120	37	42	35	35
Synthetic	800	335	80	99	—8	—16	—16
B	925	380	80	84	0	—7	—7
C	1,550	515	80	9	23	16	16
Synthetic	245	121	50	99.5	—33	—40	—40
B	285	130	50	81	—23	—29	—29
C	380	152	50	24	—7	—13	—13

Production--Engineering--Factory

Diesel Engine Fuels

(Continued from Page 5)

detonation of a gasoline engine. From the information which we have been able to accumulate, it is due to a cause exactly opposite that to which detonation in the spark-ignition engine is attributed. Many theories are advanced as to the probable causes and results of gasoline detonation, and the exponent of none of these theories has, to my knowledge, actually proved his contention. Consequently, we feel justified in adopting any theory which seems plausible as to the knocking in the compression-ignition engine. We think that the knock is due primarily to ignition lag, which changes the action of the Diesel cycle to that of the Otto cycle during the combustion period. If the fuel is injected over the period of a stroke, and does not ignite immediately when the first particles enter the cylinder, the entire charge accumulates in the combustion space and fires with an explosion instead of burning. Then, to produce a satisfactory high-speed Diesel engine fuel, it is necessary to make one which has as short an ignition lag as is physically possible and yet is a slow-burning oil.

To produce an oil which will ignite very rapidly and yet burn very slowly appears very complicated, and yet, with one of the experimental engines which is at present operating in this country, we have demonstrated that it is possible, as an oil is being used with complete satisfaction in this engine which has an initial boiling point of approximately 540 degrees fahrenheit and a smooth distillation range to 770 degrees final, with 98 per cent. recovery.

Many authorities on Diesel engines in this country and abroad feel that, even for slow-speed engines a high gravity and a low distillation range are essential. The engine using the aforementioned fuel operates over an approximate speed range of 400 to 1,800 r. p. m. The operation is knockless, smokeless and odorless. Fig. 1 shows a distillation curve of this particular oil, also that af a lighter product, which is recommended by many Diesel engine manufacturers for their engines, although it is highly unsatisfactory for high-speed compression-ignition engines. Needless to say, a high distillation product gives greater power and smoother application of power, if it can be completely burned, than the light volatile distillates, which have a tendency to explode and create very high maximum pressure.

requirements before mentioned. It will be noted that entirely different figures are obtained in running this test under vacuum, and converting the readings to 760 mm. pressure shows an end point above 1,000 degrees Fahrenheit for this oil. Such a product could not be properly burned in a high-speed engine. Fig. 3 shows the atmospheric and vacuum distillations of a satisfactory high-speed Diesel fuel. The curves are seen to be virtually parallel, and there is very little difference in the corrected figures. These charts demonstrate that it is necessary for the petroleum laboratory to determine distillation characteristics under reduced rather than atmospheric pressure.

We feel that the control of the ignition lag of Diesel fuels is dependent upon the chemical composition of the petroleum product rather than upon any of its physical properties.

Formulas Evaluate Diesel Fuel

After a considerable amount of experimentation and research work we have developed formulas by which we think that the suitability of a fuel for use in high speed Diesel engines can be evaluated by substituting the numerical values of some of its physical and chemical characteristics. We take into account the dispersion, refractory index, aniline point, average boiling point and a number of other properties. The more nearly the result of our formula approaches the arbitrary figure of 10,000, the more satisfactory we consider the fuel; as the result diverges from this arbitrary figure, the product becomes more unsatisfactory.

In Figure 4 are charted three fuels within the range of high-speed-engine operation and the results of applying the formula to these three products are listed in the caption. Curve No. 1 in Fig. 4 is by calculation and actual test the best of the three fuels for high-speed operation. Its evaluation figure is more than 6,000, while those of the other two products range below this value. It will also be noted that this product has the highest boiling range of the three. Virtually all of the results indicate that oils approaching paraffinic and saturated characteristics are superior for this service. If we select a pure paraffinic product as having a dispersion of 0.0089, then as we approach unity the oil becomes more unsatisfactory for use in high-speed engines. Similarly, the arbitrary figure of 200 degrees fahrenheit has been selected as the aniline point for a highly satisfactory oil; and, as the temperature and miscibility decrease, the functioning

(Continued on Page 10)

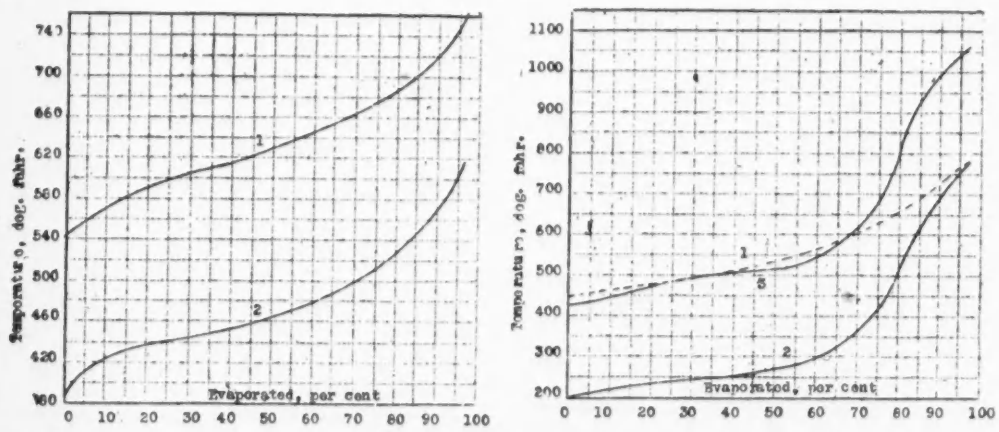


FIG. 1. (Left)—Distillation curves of satisfactory and an unsatisfactory oil for high-speed Diesels. Curve (1) satisfactory, (2) unsatisfactory

FIG. 2. (Right)—Atmospheric and vacuum-distillation curves, showing end points too high. Curve (1) atmospheric distillation, (2) vacuum distillation, 10 mm.; (3) vacuum distillation converted to atmospheric, 760 mm.

Dependence cannot be placed upon a distillation test at atmospheric pressures, as the results are fictitious at the higher temperatures. To procure reliable results, it is necessary to distill the oil in a vacuum approximately 10 mm. pressure, which prevents cracking during the process and gives reliable results.

Fig. 2 represents an oil having characteristics similar to those of the one stated in the foregoing to be satisfactory for high-speed engines. It will be noted that the amospheric-distillation curve meets all of the

MAY SALES OF NEW CARS IN CAROLINA BEST IN YEAR

Raleigh, N. C., June 16.—Sales of new cars in North Carolina in May reached the highest total of any month in the last year, Sprague Silver, director of the motor vehicle bureau, announces.

EVERLOCK LOCKWASHER WITHSTANDS VIBRATION

EVERLOCK lock washer

The Everlock lock washer is announced by Thompson-Bremer & Co., Chicago, Ill. The washer has die-formed teeth, hardened and heat-treated. The shape of the teeth causes the lock washer to hold the nut firmly even against severe vibration. The illustration shows an unretouched lock washer.

A. S. M. E. APPLIED MECHANICS MEETING HELD AT PURDUE

Lafayette, Ind., June 16.—One of the largest groups of engineering teachers to assemble for a conference met at Purdue University here Monday and Tuesday when members of the American Society of Mechanical Engineers held their first national applied mechanics meeting, under the auspices of the Indiana section of the society and Purdue officials.

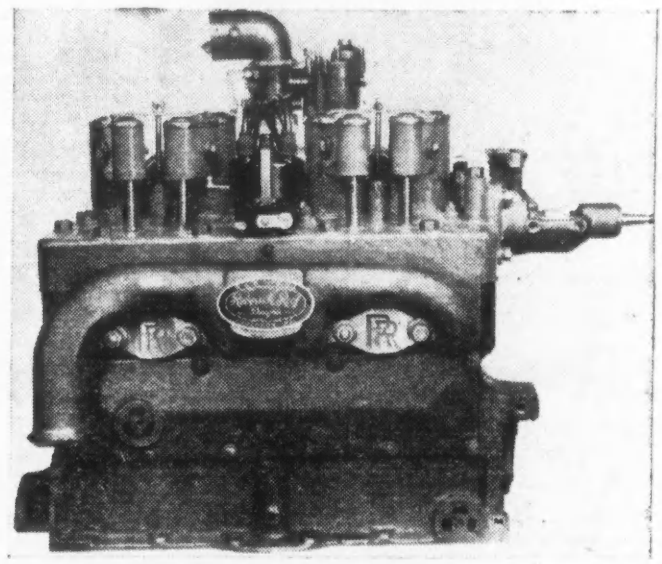
Discussions of technical subjects and inspection tours of many of the local laboratories composed the greater part of the two-day session, which came to a close with a banquet Tuesday night.

Members of the Society for the Promotion of Engineering Education were scheduled to assemble at the university Wednesday for their thirty-ninth annual meeting. The program will consist mainly of conferences and discussions pertaining to research and engineering education. At the annual dinner, at which Gov. Harry G. Leslie will appear, David E. Ross, affiliated with the Ross Gear and Tool Company and president of the Purdue board of trustees, will be one of the principal speakers.

KARI-KEEN DEVELOPS NEW LUGGAGE CARRIER

A new luggage carrier which has been under development for the past few months, is now being shipped to dealers by Kari-Keen Manufacturing Company, Inc., Sioux City, Ia. It is top-opening, finished in chrome plated hardware, and has an inside rubber mat and Du Pont lining.

R & R Overhead Valve Set For Model A Ford



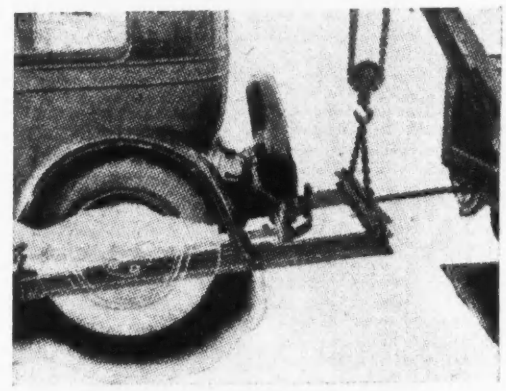
R & R CYCLONE overhead-valve equipment for model A Ford

The Cyclone overhead valve equipment for the model A Ford is announced by the R & R Manufacturing Company, Anderson, Ind. Tests reported by the company show fifty-four miles per hour in second and eighty-five miles per hour in high.

The new valve equipment consists of all controls, Packard distributor cap and wires, one downdraft or updraft one and one-half inch Winfield carburetor, two and one-half inch alloy steel intake valves, a set of four flat-seat, non-burnable steel exhaust valves with Liberty lock and keepers.

The cylinder head has a spherical combustion chamber. Rocker arms are carried in rocker boxes. All moving parts are spray lubricated. Valve adjustments are made by removing rocker box caps. A special water pump is furnished. The combination sells at $89.50.

Marquette Develops New Towing Cradle

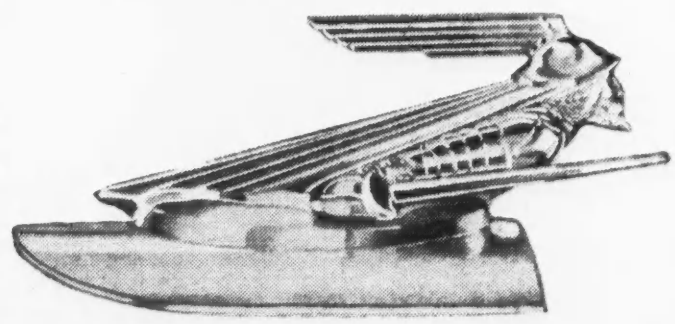


MARQUETTE towing cradle installed

A new towing cradle by means of which it is claimed all cars, regardless of aprons, fenders, bumpers, trunks, tire carriers, etc., can be quickly hooked up, is announced by Marquette Manufacturing Company, St. Paul, Minn.

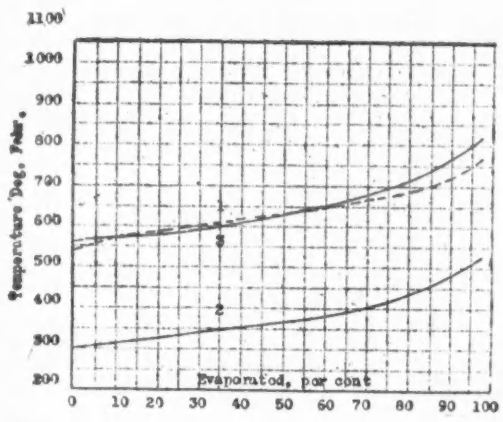
No tools are required in the use of the new device as it is installed by placing the hooks on either the running board bracket or springs for towing. The load is held by steel channels to which wood strips are bolted. The side channels are adjustable for width. The price is $27.50.

De Soto De Luxe Emblem



THE ABOVE RADIATOR CAP, emblematic of Hernando De Soto, the great discoverer, will be carried by the new De Soto de luxe 6-sedan and the de luxe 8's

Automotive Diesel Fuels



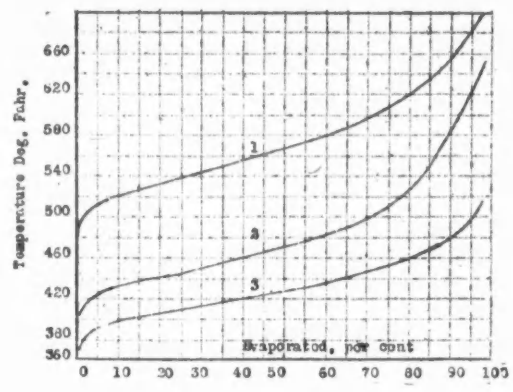


FIG. 3. (Left)—Atmospheric and vacuum-distillation curves, showing satisfactory end point. Curve (1) atmospheric distillation, (2) vacuum distillation, 10 mm.; (3) vacuum distillation converted to atmospheric, 760 mm.

FIG. 4. (Right)—Distillation curves of three representative oils

(Continued from Page 9)

of the oil in the engine is also affected.

Physical Characteristics of Oils Charted

Curve No.	1	2	3
A.P.I. gravity	36.5	29.4	40.5
Aniline point	163	114	141
Viscos. at 100 deg. F., Say.	39	35	34
Auto.-Ignition Temp. in Air, deg. F. 1 above	730	730	730
Ignition Temp. in oxygen Deg. F.	485	511	503
Bomb Sulphur, per cent.	0.273	0.171	0.049
Dispersion at 100 Deg. F	0.0127	0.0118	0.0126
Refractory Index at 100 Deg. F.	1.4597	1.4814	1.4489
Evaluation	6610	4860	5360

As to the sraight physical characteristics of various petroleum products and their effect on the operation of high-speed Diesel engines, we have noted that a great many Diesel-engine manufacturers have established limits in their specifications for the oils which are unnecessary and merely require further treating and handling in the refinery, resulting in prohibitive prices for such oils. For instance, the manufacturer demanded an acid free oil for some high speed engines sold in South America. The petroleum supplier in that section, to comply, was required to acid-treat, soda and water-wash the oil which was a kerosene distillate. If the actual cost to the refiner had been applied on the product, the purchaser of the Diesel engine would have done far better, from an economic point of view, to operate a gasoline engine and pay the price of gasoline.

In a great many oils there is a trace of naphthenic acid which is not detrimental to metallic surfaces, and to remove them requires considerable treatment. Furthermore, there has been considerable agitation among some engineers as to the gum content of Diesel fuels. The gum does not affect the Diesel engine. We have operated Diesel engines on fuels containing as high as 1.600 mg. of gum per 100 ml. of oil, which would cause considerable shut-down in any gasoline engine due to gum formation in the inlet manifold and sticking of the inlet valves. But in the Diesel engine, where burning follows injection immediately and there is no slow oxidation as in the inlet manifold of the gasoline engine, a fuel containing gum is not objectionable; although a high percentage of gum usually indicates an unsaturated oil, which is undesirable for high speed operation.

Viscosity is a very important property with high-pressure lapped-piston pumps and small, light check valves such as are used in the ordinary injection system. Sufficient lubricating quality is necessary in the oil to lubricate and seal the injection plunger, pump valves and check valves; otherwise, wear will destroy the plunger very rapidly. Leakage past the check valve will result in uneven operation of the engine, and in some cases complete cutting out of one or more cylinders, and it may result in carbonization of the injection orifices. We believe that a viscosity of 45 sec. Saybolt universal at 100 deg. Fahr. is the minimum to assure sufficient body, and a maximum of 65 sec. would assure a thin enough oil for high-speed work to be handled through the small lines with which the ordinary automotive job would be equipped. The common pump designed to deliver gasoline from a storage tank to a carburetor has not sufficient power to handle oil of this type. Larger and more powerful pumps or booster pumps in the lines are necessary when the tank is at any considerable distance from the engine.

Although sulphur is not important in large engines, it does have an effect on the automotive Diesel engine, especially if the engine is in intermittent service and stopping and starting continually. Contamination of the crankcase due to condensation of gases left in the combustion space and formation of acid in the exhaust manifold would be the result of such service. It has been found from experiment that piston-pins often suffer in very cold weather from high-sulphur oils.

Flash of a Diesel fuel is of absolutely no consequence, as we have operated high-speed Diesel engines on oils with actual flash-points of 150 to 320 degrees Fahrenheit, without encountering trouble from starting at winter temperatures or any noticeable difference in the general operating characteristics.

The Rear Engine Car

(Continued from Page 8)

the rear axle, but there seems to be no doubt but that a better weight distribution is obtained when the engine is forward of the rear-wheel axis rather than behind it. If a flat, opposed engine is used, it can even be placed directly above the rear-wheel axis; but there appears to be some advantage in not having the engine between the wheels, especially if an in-line or V-engine is employed, with its axis placed longitudinally.

The gearset need not be bolted directly to the engine as in conventional practice. It can be placed next to the engine; the differential can be interposed between the two units; or, if the engine is placed transversely, the gearset can be positioned either behind or in front of it. The primary reduction, taking the place of ordinary axle gears, can then be made directly at the engine. This presumably would involve heavier transmission gears than are required at present, but they would turn at lower speed and consequently would be less difficult to keep quiet.

The type of drive from the engine to the rear wheels—or to the rear axle, if an axle of conventional type is selected—naturally will depend upon the arrangement of engine and gearset. Nearly all designs thus far produced involve the use of wheels with independent springing, at least in the rear, and consequently make it necessary to use a gearset and differential mounted on the chassis and to connect the latter with the wheels by universal shafts or to use oscillating axles pivoted about the longitudinal axis of the differential. Those who prefer to avoid independent wheel springing may find it expedient to use the old De Dion type of axle with the differential on the chassis and wheels connected by an offset tubular axle. Still other arrangements are possible; one of the most promising which I have seen I am not at liberty to discuss. I am confident not only that the problems involved in perfecting a satisfactory arrangement of rear engine, gearset, differential and drive are possible to solve, but that they can be solved in such a way as to effect a marked improvement over conventional arrangements.

Questions of cooling naturally will involve study. Air-cooling is far from being out of the question. Water-cooling should not prove difficult, especially if fixed notions as to conventional radiators are abandoned and thought is given to an arrangement which will fit the particular set of conditions that rear engine arrangement involves. The possibilities of evaporative cooling certainly should not be overlooked. It may not be essential to place the radiator close to the engine in order that the fan may be close to the power source, but there are obvious advantages in having the three together. It is desirable also, for the sake of economy, to arrange the cooling-air intake in a region of fairly high wind pressure and to exhaust it at a point where the pressure is low, to keep down the power requirements of the fan.

Control arrangements present certain minor problems, but they should not be difficult of solution if given adequate consideration when the main units are designed. Presumably the controls can be brought, if desired, to something approximating a common junction block, and can be so arranged that the whole power plant, drive and rear wheels can be detached as a unit without disturbing the body or forward end of the chassis in any way, in the event that major repairs are required. Such an arrangement would facilitate service work and minimize delays. It certainly should be given consideration in making any rear-engine layout.

To allay possible apprehension of those who may fear that the driver of a car having rear engine mounting is more liable to accident if seated nearer the front of the vehicle than in conventional cars, it may well prove expedient to place parts having some substantial mass, such as the spare wheels or tires, at the extreme front, housing them properly to avoid an unsightly appearance and unnecessary wind resistance. A substantial bumper also should be provided. These two expedients should make the driver and passengers at least as safe against injury as in present cars, and possibly somewhat safer.

My object in this paper has been to set forth the case for rear engine mounting with such supporting evidence as is available. A case against the construction would not be difficult to build up, but my opinion is that the advantages of placing the engine in the rear far outweigh the disadvantages, or even the advantages of adhering to the present conventional arrangement.

Field for Synthetic Oils

(Continued from Page 8)

basis is at present under investigation at the authors' laboratory, and it is hoped that the method may be described at an early date.

Steering-Gear Lubrication

Lubrication of the steering-gear presents several annoying problems. Highly viscous lubricants generally are required in order to prevent binding in some gears and clearance rattles in others. On the other hand, because of the difficulty of changing lubricants to meet weather requirements, the lubricant must interfere as little as possible with operation of the gear after the car has been allowed to stand idle at low temperatures. In the case of one particular gear upon which considerable work was done, this laboratory found that 50,000 poises represented the maximum steering effort of 170 in.-lb. at 13 deg. per sec. rotation of the steering-wheel. This value applied to the unloaded gear disconnected from the steering-gear connecting rod. Table 5 presents the temperatures that are permissible with typical lubricants from the point of view of low-temperature steering effort.

TABLE 5—Permissible Temperatures of Typical Lubricants for Low-Temperature Steering Effort With Cam-and-Lever Type Gear.

	Viscosity, in Sec., at Deg. Fahr. 100	130	210	Temperature Limit for Satisfactory Steering (50,000 Poises), Deg. Fahr.
Synthetic	3,500	1,250	200	—25
B	5,000	1,580	200	— 6
C	12,500	2,540	200	22
Synthetic	2,300	930	160	—33
B	3,800	1,180	160	— 9
C	8,500	1,800	160	17

The use of appreciably higher viscosities than those indicated in Table 5 is desirable in some cases. Viscosities above 200 sec. at 210 deg. Fahr. almost invariably involve the use of heavy residual-type black oils, the tempeature-viscosity characteristics of which are none too good at best. If it is desired to use such a highly viscous product within the limiting conditions described, the typical oils will be found to behave about as shown in Table 6.

TYPE 6—Viscosity of Heavy Residual Oils at 210 Deg. Fahr., Which Corresponds to 50,000 Poises at —10 Deg. Fahr.

Type of Lublicant	Saybolt Seconds
Synthetic Oil Blended with	
B-Type Residual	300
A-Type Residual	280
B-Type Residual	235
C-Type residual	75

Shock-Absorber Fluids

One type of hydraulic shock-absorber studied in connection with this work was found to operate fairly satisfactorily with oil viscosities as high as 1300 poises. An oil to be used in cold weather should not exceed this vicosity at—10 deg. Fahr. so as to avoid faulty action and even mechanical failure due to excessive stiffness. On the other hand, viscosity is a decided asset at normal temperatures, as the higher the viscosity of the lubricant which can be used is, the larger are the permissible manufacturing tolerances. General practice is to employ rather light fluids and small clearances in order to maintain a small temperature susceptibility of the instrument. Fabrication of those shock-absorbers that depend primarily upon viscous flow of the fluid can be simplified by the use of larger tolerances and fluids of high viscosity but low viscosity-temperature coefficients. Table 7 is presented to show how it is possible to secure high viscosities at normal temperatures without exceeding, for example, 1300 poises at —10 deg. Fahr.

TABLE 7—Comparative Viscosities of Synthetic and Typical Oils at Normal Temperatures

	Viscosity at Deg. Fahr. —10	70	100	130
Oil	Stokes*	Sec.	Sec.	Sec.
Synthetic	1,300	3,250	1,100	465
A	1,300	3,000	1,050	450
B	1,300	2,400	815	335
C	1,300	1,400	465	185

*Viscosities at low temperatures are expressed as kinemaic viscosities in "stokes;" that is, the absolute viscosity in poises divided by the density of the oil.

Synthetic Oils as Engine Lubricants

An important purpose underlying the development of these synthetic oils was their use for internal-combustion engines, particularly aviation engines, in which oils having good temperature viscosity characteristics plus a high resistance to sludge formation are essential. From the point of view of combustion-chamber carbon formation, the synthetic oils do not offer quite as much advantage as would ordinarily be expected from their very low Conradson carbon tests. Their extremely low volatilities are responsible for this, but, because of the almost entire absence of asphalt-forming constituents, the rate of formation of carbon in the engine is markedly slower than with conventional oils, the highly volatile Texas-type products excepted.

The engine data thus far available do indicate one highly desirable property for these synthetic oils, namely, a very low tendency to form insoluble sludge. This is particularly important in lubricants for direct-cooled aircraft engines, certain motor coach engines and the like. Table 8 shows a few examples of the data obtained in a series of comparative tests on a variety of oils at elevated engine temperatures. In addition, a flight service test is in progress with one of the authors' company airplanes. While this airplane has been flown approximately 100 hours to date, using these oils, it is too soon to draw any definite conclusions, as such a test should cover in the neighborhood of 300 hours.

To illustrate the advantages of small viscosity temperature coefficient and low pour points from the point of view of starting and cold-weather lubrication, one needs only to refer to work already published. Improvements in viscosity temperature characteristics obviously must be reflected in lessened interference with cranking. The pour point is of principal interest because of its influence on the tendency of the oil to flow to the pump intake.

The synthetic oils must still be regarded as in the development stage, even though they have been produced in commercial quantities. Their principal advantages lie in the greater freedom which they allow the designer of mechanism in which they may be employed, although their use in certain existing units may result in marked improvement in some phases of performance. Just how far their characteristics can be profitably exploited in general practice remains to be seen.

Table 8—Examples of data from comparative engine-tests on a variety of oils at elevated engine-temperatures

	Viscosity, in Sec., at 210 Deg. Fahr. New	50 Hr.	Acidity, Mg. KOH per Gram	Sludge, Mg. per Gram Car-Asphal-bon	tenes	Piston-Head Carbon, Grams	Oil Consumption, Lb. per B. Hp.-Hr.
Oil	108	140	1.0	1.2	0.3	5.2	0.0034
Synthetic	122	195	1.9	9.3	0.8	15.0	0.0081
A	85	131	1.6	3.5	70.0	7.9	0.0052
C	Conditions of the Tests						
Engine, air-cooled passenger car model							
Duration of Test, hr.							50
Speed, r. p. m.							1,500
Crank Case Temperature (oil sump), deg. fahr.							275
Cylinder-Flange Temperature (average), deg. fahr.							320
Cylinder-Head Temperature (average), deg. fahr.							435

Coast Ford Dealer Has Formula to Stimulate Business

Walter Fowler of Los Angeles Advocates Concerted Effort Toward Early Closing to Allow People More Time to Drive

LOS ANGELES, June 16.—**A concerted effort upon the part of all branches of the retail automotive industry to bring about early closing of all retail business establishments is urged by Walt Fowler, metropolitan Ford dealer, who sees in such a nationwide movement a great stimulant to the entire automotive industry.**

"The automotive business benefits more by holidays than any other industry," Mr. Fowler pointed out. "For instance, the recent two-day holiday created by Decoration Day falling on a Saturday resulted in more motoring during those two days than any other four or five ordinary days. Every extra mile that is driven is directly reflected in additional sales of new cars, used cars, accessories, parts, service, oil, grease and gasoline.

"Yet, paradoxically, in spite of the fact that the automotive industry receives the greatest benefit from this leisure time, this same industry is the worst offender in zealously refraining from itself creating any leisure time. We see the spectacle of automobile dealerships keeping their establishments open until 9 and 10 and even 11 o'clock at night in an effort to force sales.

"Instead of doing this all branches of the retail industry, with the exception of gasoline stations, should encourage universal early closing hours, so that their employees could get out on the road and set an example for other retail businesses to do likewise. This is the logical way to bring about a greater volume of natural sales, instead of trying to force them by burning the midnight oil in retail establishments. If prospective customers can't get the time to use automobiles, they are not going to buy them, even if automobile establishments keep their salesrooms open all night long. If all businesses were as flagrant offenders in staying open nights as is the automotive industry, few, indeed, would be driving on the roads in the evening and fewer still would be the number of new cars sold, service jobs written up and replacement parts installed.

"The typical family that might drive only twenty or thirty miles of an evening can travel 500 miles or more on a two-day holiday, and many of them do. Thousands of people during the two-day Decoration Day holiday made a round trip to San Francisco from here, or trips of similar distance. Such trips resulted in bringing those cars just a thousand miles nearer to a trade-in deal and much nearer to a complete overhaul.

"Such an early-closing movement could have a far-reaching and immediately stimulating effect on the entire industry if it were sponsored by state and national automotive trade organizations. I fully realize the futility of any sporadic effort along these lines made by individual dealers here and there. Only by unified action can the automotive industry get a larger percentage of the consumer's dollar."

UNION CITY, N. J., DEALER RETURNS TO CHRYSLER

Newark, N. J., June 16.—Alfred De Cozen, president and general manager of the De Cozen Motor Company, Chrysler distributor, announces the appointment of the A. G. Motor Sales Corporation as its representative in Union City.

Andrew Gambino, president of the A. G. Motor Sales, up until two years ago had been a dealer for the De Cozen Motor Company, since the inception of the Chrysler car in 1924. In fact his connection with De Cozen dates back to the days of the Maxwell and Chalmers car, and his recent reinstatement as a Chrysler dealer in Union City has brought him back to the De Cozen fold.

The A. G. Motor Sales Corporation is one of the oldest automobile dealerships in Union City, having occupied the same building at 4424 Hudson Boulevard about fifteen years.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

TECHNICAL SESSIONS, GOLF, GET ATTENTION OF S. A. E. DELEGATES

(Continued from Page 1)

round of the championship play are as follows: F. W. Telford, Goodyear Tire and Rubber Company, 77; J. B. Shea, Firestone Tire and Rubber Company, 78; R. F. Jones, Russell Manufacturing Company, 79; A. W. Anderson, Borg & Beck, 80.

The second foursome will consist of J. H. McDuffee, Prestolite Storage Battery, 81; F. A. Sharpe, Thermoid Rubber Company, 82; T. Burke,, Vanadium Corporation of America, 83; Sandy Brown, Bakelite Corporation, 84.

The third flight will consist of J. Sneed, Firestone Tire and Rubber Company, 86; T. R. Dahl, 86; J. G. Monjar, Detroit Gear and Machine Company, 89; M. H. Cox, Fafnir Bearing, 91.

INDUSTRY EMPLOYMENT IN OHIO SLIGHTLY DOWN

Columbus, O., June 16 (UTPS).—The Bureau of Business Research of Ohio State University, in a bulletin showing employment in the automobile and automotive parts industries in Ohio, shows that May employment was 1 per cent. lower than that of April this year and 15 per cent. less than in May, 1930.

Of the fifty concerns reporting twenty-six showed increases in May employment over April, twenty-two reported decreases and two showed no appreciable change. Average employment in the industries for the first five months of the year was 16 per cent. less than that of the corresponding period of 1930.

NEWARK OAKLAND-PONTIAC DELIVERIES TO BE RAISED

Newark, N. J., June 16.—Horace A. Bonnell, head of the Bonnell-Mason Company, local distributor of Oakland-Pontiac cars, returned last week from a Western trip, where he arranged for increased deliveries of cars to meet local demands.

Chevrolet Sales in Alliance Continue Brisk in Half Year

DOMINATING new passenger car sales for five consecutive months in the greater Alliance area, Chevrolet demand continues brisk with the wane of the first six months of 1931, a survey of leading dealers indicates. Peak sales were attained in April, when fifty-one Chevrolet passenger cars were delivered in this district, a new high monthly sales mark for more than a year.

After mounting to more than a half hundred deliveries in April, sales tobogganed back to twenty-seven during the month of May, and from all indications will equal this mark during the present month While there is no evidence of waning popularity, distributors here believe that from now until the end of the summer sales will experience a sharp falling off, with the minimum to be reached after September.

J. H. Keller, president of the Keller Motor Company, largest Chevrolet distributor in the Alliance district and one of the oldest automobile dealers in this section, views the future optimistically, he said this week, but doubts if any other month in 1931 will see the activity of the month of April.

"Several factors have a bearing on the future of the automobile selling game here," Mr. Keller said. "When peak sales were reached in April industrial activity was at its height for the first quarter. Now there has been some curtailment, and further slackening of industry can be looked for from now until fall. Retail business here also is in a slump after a temporary flurry which was apparent in March and April. Many who planned to buy new cars this year and who were listed as potential buyers have given up purchasing a new car and many of these are coming in inquiring about good used cars," he added.

The Keller Motor Company, up to the present time this year, has delivered a total of eighty-seven new Chevrolet passenger cars in the Alliance territory, according to Mr. Keller. Contrasted to the same period in 1930, sales so far this year have been considerably ahead in this particular area, he declared.

Mr. Keller declared that to dispose of this number of new cars in the five months this year has meant hard work on the part of the sales department. "Our sales manager does not sell a single car, but confines his efforts to supervision of the salesmen," he said. "So it is up to him to get results."

Based on total sales made in Stark county, where Canton is the largest trading center, the Alliance district has contributed its full share of the sales the first five months of the year, considering the limited territory involved and the industrial and retail situation, which has been none too brisk for more than a year.

According to Mr. Keller, service demand has been holding up well so far this year, with a greater percentage of the new car owners being content with the class of service rendered by his firm. Of course, there have been times when service demand has been spotty, but the off periods have been counteracted by a like period of activity which has more than squared the deficit. He predicts that the service end of the business will continue satisfactory throughout the summer months, due to the brisk sales of used cars, which will require service after a few weeks of operation

As in many other communities in eastern Ohio, there was a larger number of cash sales the first quarter of 1931 than any other like period in recent years. Buyers in March and April, when it appeared as if the depression was at an end and better times were close at hand, were inclined to pay cash for their new cars. In recent weeks there has been more and more requests for installment paying and, as the summer progresses, it is believed that cash buyers will continue to be fewer

OAKLAND DEALER NAMED

Lincoln, Neb., June 16.—Halsted Motor Company, 2615 North 48th St., has been appointed dealer for Oakland and Pontiac in University Place, suburb of Lincoln.

Cumulative New Commercial Car Registration Statistics, May, 1931

Returns for today: Arkansas, Florida, Idaho, Minnesota and Rhode Island.

In this table 14 states and the District of Columbia.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Essex	FWD	Fargo	Federal	Ford	G. M. C.	International	La France-Republic	Mack	Paige	Relay	Reo	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys	Willys-Knight	Miscellaneous	Totals	States
Arkansas			63		2			1		100	2	13					1						5	1		2	190	Arkansas
Delaware	4		41		2		1		1	41	1	12										1				3	107	Delaware
Florida			122		7				4	188	2	27				1	6					2	2	1		2	364	Florida
Idaho			55		16					89	3	9									4			3			179	Idaho
Illinois	3	5	429	36	71			1	3	641	18	137		13		3	6		5	1	26			14	1	39	1452	Illinois
Minn.			328	15	30				7	413	10	128	1	4	1		14	2			20		6	25		9	1013	Minn.
Montana			32		3					76	6	30		1			5		1		1			2		2	159	Montana
Nor. Dak.		1	73		16					82	5	76					1				5		1	3			263	Nor. Dak.
Rho. Isl.	2		46	6	26			1	3	119	4	10	7				4		2	1					1	2	234	Rh. Island
So. Caro.			125		3					151	1	9	1	1			1				3					2	297	S. Carolina
S. Dakota			64	7	11					81		46				1	2	1			6						219	S. Dakota
Utah			55		4	1				74	4	9				1	4				1			1			154	Utah
W. Va.	1	3	150	1	25					155	3	25		2		1	5			1	5		5	8		1	391	W. Va.
Wiscon.			319	17	19		4		2	402	17	59		1	2		4	1	3	1	18		2	19		10	900	Wisconsin
D. of Col.	3		46	6	3	2			1	124	6	9		7		1	1						2			4	215	Dist. of C.
Totals	13	9	1948	88	238	3	5	3	21	2736	82	599	9	29	5	6	54	4	11	4	89	3	23	77	2	76	6137	Totals
Ark., 1930			152		7			1		142	8	60		3			1						2	2		2	380	Ark., 1930
Dela., '30	6	4	43	1	4	1				88	14	9		1			3	1		3				1			179	Dela., '30
Fla., 1930		4	148		9				1	223	6	8		1		1	1									1	403	Fla., 1930
Idaho, '30			72		7		2			117	1	8							1		1			1			210	Idaho, '30
Ill., 1930	4	11	661	71	61			12	4	911	36	135		18	3	2	19	1	2	5		13	12	15		78	2074	Ill., 1930
Minn., '30			72		7		2			117	1	114	1	12	2	2	16	2			4	5	16	14	1	18	1357	Minn., '30
Mont., '30			63	1	9			5	1	97	6	32		8			4				2	2	5	2		1	238	Mont., '30
N. D., '30			86	6	7			5		113	7	68					11	1				1		2	1	3	311	N. D., 1930
R. I., '30	3	4	56	2	29			6	4	102	11	12		1			14	1	2		1					4	252	R. I., 1930
S. C., '30		1	134		1		1			188	4	5		1			1				2	1	1			1	340	S. C., 1930
S. D., '30			99	3	5			1	1	84	1	44		1			11				1	2	1	3	1	1	259	S. D., '30
Utah, '30			73		8					132		5		2			7	3			1		2	1		5	239	Utah, '30
W.Va., '30		4	155	2	38	1		1	3	189	18	57	1	1	1		9	1		2	1			1		5	490	W. Va., '30
Wis., '30			449	37	27	1		4	7	563	29	96		3	1	3	24	1	14	7	4	6	3	10		23	1812	Wis., '30
D. C., '30	1	4	31	4	3	2			1	94	3	8		1	1		4					2	5				164	D. C., '30
Totals	14	38	2641	143	264	8	4	44	24	3654	178	661	2	53	8	8	125	11	19	17	17	32	47	52	3	141	8208	Totals

Seasonal Decline in Car Sales in East Is Slight

NEW YORK, June 16.—Retail sales of new passenger cars in three states of the East, Delaware, Maryland and West Virginia, in May totaled 6,872, as against 7,102 in the preceding month, and comparing with 9,511 in the corresponding month of last year.

This was a seasonal decline of only 3.2 per cent., which was somewhat smaller than usual, and a falling off from a year ago of 28 per cent. For the first five months of this year, new car sales in these three states aggregated 25,520, as compared with 35,942 in the corresponding period of 1930, a decline of 29 per cent.

Delaware sales in May were 2.3 per cent. above those of April, while the decline from a year ago was 22 per cent. In the first five months, new car registrations in Delaware were off 24 per cent. from the similar period of 1930.

Maryland reported a decline of 3 per cent. in May from April, and 17 per cent. from last year, while the five months' falling off was 40 per cent.

In West Virginia, the May decline from April was 4 per cent., while the drop from a year ago was 40 per cent. For the first five months, sales in this state declined 35 per cent.

The following tables show the new car registrations by months in the three states for this year, as compared with last:

DELAWARE

	1931	1930
January	291	441
February	340	533
March	564	869
April	690	987
May	706	911
Totals	2,591	3,741

MARYLAND

January	1,609	2,298
February	2,074	2,892
March	3,259	4,377
April	3,738	5,076
May	3,624	4,361
Totals	14,304	19,004

WEST VIRGINIA

January	924	1,493
February	1,021	1,653
March	1,464	2,602
April	2,674	4,210
May	2,542	4,239
Totals	8,625	13,197

Comparative registrations for some of the leading selling cars in each of the states are shown in the following tabulations:

DELAWARE

	May, 1931	May, 1930	April, 1931
Ford	245	374	236
Chevrolet	215	225	207
Buick	49	49	39
Oldsmobile	13	12	22
Pontiac	40	32	40
Packard	8	16	10
Essex	22	14	17
Hudson	4	11	9
Dodge	4	9	6
Studebaker	6	12	3
Willys	11	10	9

Five Months

	1931	1930
Ford	862	1,635
Chevrolet	785	862
Buick	176	181
Oldsmobile	70	59
Pontiac	142	145
Packard	41	63
Essex	66	93
Hudson	30	46
Dodge	18	27
Studebaker	21	37
Willys	37	41

MARYLAND

	May, 1931	May, 1930	April, 1931
Ford	1,055	1,725	1,132
Chevrolet	1,382	1,294	1,342
Buick	125	204	138
Oldsmobile	54	59	69
Pontiac	216	128	182
Nash	50	64	56
Essex	82	97	87
Dodge	61	79	62
Studebaker	70	99	74
Plymouth	59	61	83

Five Months

	1931	1930
Ford	4,173	7,459
Chevrolet	5,347	5,608
Buick	575	870
Oldsmobile	238	295
Pontiac	719	773
Nash	226	282
Essex	329	571
Dodge	269	329
Studebaker	306	363
Plymouth	248	202

WEST VIRGINIA

	May, 1931	May, 1930	April, 1931
Buick	60	108	72
Chevrolet	772	1,215	827
Chrysler	98	98	102
Dodge	94	151	114
Essex	49	91	64
Ford	794	1,688	830
Oldsmobile	50	61	41
Plymouth	79	110	83
Pontiac	153	121	151
Willys	113	87	91
Studebaker	31	54	40

Five Months

	1931	1930
Buick	226	292
Chevrolet	2,812	3,925
Chrysler	270	290
Dodge	339	506
Essex	217	465
Ford	2,632	4,566
Oldsmobile	172	251
Plymouth	236	269
Pontiac	453	417
Willys	265	236
Studebaker	168	208

NEW IMPROVED PLYMOUTH DUE

(Continued from Page 1)

product through Chrysler, Dodge and De Soto dealers. Gossip has it that the plant already is in active production on the new models, with an output of 11,000 planned for June and a schedule for 15,000 in July planned. It is reported there are now 7,500 on the payroll in comparison with the 4,500 of a month ago. By the end of the month it is thought this will be increased by 2,000.

In explanation of the anticipated Plymouth development, it is understood here that Mr. Chrysler long has sought to strengthen his position as the third largest producer by building volume sales in the field in which the buyers are most numerous, meaning the Ford and Chevrolet class. When Chrysler reduced his Plymouth prices a year ago to approximately the Ford level, his announcement avoided any implication of a "war with Ford," but it is believed now that such an implication was purposefully avoided, because he was not prepared to invade the market dominated by Ford. Now, however, it is said he is ready to throw his hat into the ring. With new models and a strong organization behind them, it is declared this low-priced unit of the Chrysler group is going to be a decided factor in the low-priced field.

In response to inquiries, Walter P. Chrysler stated today that whatever may be his plans for the future development of the business of the Chrysler Corporation, they have no more reference to Mr. Ford than to any other automobile manufacturer.

"We have always manufactured a four-cylinder car," said Mr. Chrysler, "because I have always been of the opinion that there was a large potential market for a car that can be built as economically and ruggedly as a four-cylinder car, and still embody the style, speed and performance which people of modest means desire in an automobile. That was our purpose in building our present Plymouth, and with it we have been in direct competition for business in the lowest price field for more than a year with increasingly satisfactory results. Naturally, we hope to continue in this field, and I believe that the progress of automobile engineering will soon bring about important developments which will expand our market more than ever."

ALBISSER OBTAINS AUBURN DEALERSHIP AT RAHWAY, N. J.

Rahway, N. J., June 16.—The Export Garage, Inc., has been appointed as authorized dealer for the Rahway territory for Auburn cars. The Expert Garage is owned by Henry L. Albisser of Rahway, a pioneer in both the automotive and aviation industries. Albisser first flew an airplane in 1909 and later won considerable reputation as a French automobile racing driver.

1st

We believe this is the first time in the history of S. A. E. meetings that verbatim discussions have been printed while the S. A. E. meeting was in progress.

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